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REVIEW OF APPLIED MYCOLOGY

VOL. XXXVI MARCH 1957

Literature references in [ ] refer to the *Review of Applied Mycology*.
Map references are to the C.M.I. distribution maps of plant diseases.

WRIGHT (J. E.) & IACONIS (CELINA L.). **Estudios sobre Basidiomycetes. III. 'Polyporus rickii' f. sp. 'negundinis' sobre Arces vivos.** [Studies on Basidiomycetes. III. '*Polyporus rickii*' f. sp. '*negundinis*' on live Maples.]—*Rev. Invest. agríc., B. Aires*, 9, 2, pp. 97–109, 1 pl., 2 figs., 1955. [Received 1956.]

In the course of their studies on the Polyporaceae of Argentina [34, p. 488] the authors observed that maples (*Acer negundo*) in the cities of Buenos Aires and Eva Perón were regularly attacked by a fungus identified as *Polyporus rickii* f. sp. *negundinis* n.f., distinguished by the absence of setae from the tubules. The pileus has a yellowish, velvety surface, the margin being glabrous, obtuse, and usually greyish-yellow. The context is dark chestnut, lighter towards the periphery, fragile, and fibrous. The sulphur yellow pores measure 2 to 3 mm., and the yellow, broadly ellipsoidal spores, 3·6 by 5·2 by 7·2 μ, are borne on sterigmata 2·4 by 2·9 μ.

MALLINJOUD (H. M.). **Contribution à l'étude des causes du dépérissement du Platane.** [A contribution to the study of the causes of decline of Plane trees.]—*Rev. hort. Paris*, 128, 2213, pp. 1512–1515, 6 figs., 1956.

Owing to careless pruning and other forms of mechanical ill-usage, *Platanus acerifolia* trees in France, especially when old or growing in very poor soil, become weakened and liable to attack by various parasites. The author has observed anthracnose (*Gnomonia veneta*) [*G. platani*: cf. 26, p. 271; 31, p. 638] only on old or weakened trees, particularly those growing in unfavourable conditions in large towns. On such trees the fungus appears to behave as a wound parasite. It is suggested that it may, perhaps, become possible in time to control the disease by means of systemic fungicides. *Polyporus hispidus* [cf. 25, p. 87; 34, p. 549] was also commonly found on plane trees subjected to excessive pruning; crown gall (*Bacterium* [*Agrobacterium*] *tumefaciens*) was occasionally present, though the vitality of the trees did not appear to be adversely affected by it.

It is suggested that improved pruning methods and satisfactory cultural conditions should maintain the trees in good health.

PŘÍHODA (A.). **Poškození Habrového semene při stratifikaci.** [The decay of Hornbeam seed during stratification.]—*Lesnictvy* (*Ann. Acad. tchécosl. Agric.*), 28, 3, pp. 385–392, 7 figs., 1955. [Russian and English summaries.]

Considerable loss of hornbeam seed collected in Bohemia and Moravia, occurring during stratification in moist sand, was caused by *Verticillium candelabrum*, *V. affine*, and *V. albo-atrum*. Where the sand was somewhat dry or the seed was collected from a drier area it remained sound. These fungi are sometimes present on the seed before it falls as also are *Trichothecium roseum* and many saprophytic species.

JENÍK (J.). **Původce a ekologický význam hlízek na kořenech Olše.** [The cause and ecological significance of the root nodules on Alder.]—*Lesnictvy* (*Ann. Acad. tchécosl. Agric.*), 28, 3, pp. 375–384, 3 figs., 1955. [German and Russian summaries.]

After a review of the literature on nodule formation in the alder attributed to *Plasmodiophora alni* [cf. 31, p. 36], the author reports that he found no improvement in sandy soil planted with alder. He concludes that the main advantage of the species lies in its rapid growth, and that its ameliorative action on the soil should not be overrated.

TOKUSHIGE (Y.). **On the oxidase of Paulownia affected by witches'-broom.**—*Sci. Bull. Fac. Agric. Kyushu*, 15, 2, pp. 145–150, 1 graph, 1955. [Japanese, with English summary.]

In a study of healthy *Paulownia* trees compared with those affected by witches' broom [virus: 33, p. 646] carried out at Kyushu University, Japan, the author found that the oxidase activity of diseased leaves was 20 per cent. greater than that of healthy ones; there was an increase of 40 per cent. in diseased roots, but scarcely any difference in the stems. The increased activity of polyphenol oxidase and of respiration in diseased leaves suggests that this oxidase may play a part in respiration as a terminal oxidase, and may account for the more rapid browning of the sap of diseased as opposed to healthy leaves.

BATKO (S.). **Meria laricis on Japanese and hybrid Larch in Britain.**—*Trans. Brit. mycol. Soc.*, 39, 1, pp. 13–16, 1956.

During the summer and autumn, 1954, *Meria laricis* [35, p. 556] was observed on Japanese larch (*Larix leptolepis*) in Cornwall, Kirkcudbrightshire, and Wigtownshire and on hybrid larch (*L. eurolepis*) in Wigtownshire and Caernarvonshire, constituting new host records for Great Britain.

MÜLDER (D.). **Die Bedeutung des Blasenrostes für die Saatgutbeschaffung und Pflanzenanzucht bei Strobe.** [The significance of blister rust in seed production and plant breeding in the *Strobus* Pine.]—*Allg. Forstz.*, 11, 8–9, pp. 110–113, 1956.

In a discussion of resistance to *Cronartium ribicola* in white pine ([*Pinus*] *strobus*) [34, p. 557 and next abstract] in Germany, the author considers that at present no nursery can claim to produce resistant seed, such claims, where made, only indicating that the nursery is free from infection. He suggests that a 50- to 60-year-old stand be cleared of all infected trees and then used for seed production. The remaining trees would thus have given proof of ability to resist infection for a long period and there would be a good chance that the seed would have inherited the resistance.

Referring to guarantees and compensation under existing conditions, he proposes two possible forms of agreement. Under the first (general agreement) the forester would be able to refuse stock if he considered it unsatisfactory. After acceptance, however, and provided always that the nursery could prove that proper precautions had been taken, he could demand replacements only for any trees which proved to have been affected.

Under a special agreement the nursery would issue a certificate that the seed beds and transplant beds had been at a specified distance from the nearest *Ribes*; that constant watch had been kept for infection and infected plants rogued; and specifying the percentage of infection. The nursery would undertake to provide fivefold replacements for all trees exhibiting aecidia in the first two years after planting. There would be no claims for compensation under either form of agreement.

Bingham (R. T.), Squillace (A. E.), & Patton (R. F.). **Vigor, disease resistance, and field performance in juvenile progenies of the hybrid Pinus monticola Dougl. × Pinus strobus L.**—*Z. Forstgenet.*, 5, 4, pp. 104–112, 2 figs., 1956. [German and French summaries.]

The results of preliminary evaluations at Spokane, Washington, of reaction to white pine blister rust (*Cronartium ribicola*) [see preceding abstract] in eight juvenile hybrid progenies of *Pinus monticola* × *P. strobus* indicated a lower degree of resistance as compared with corresponding intraspecific material. Thus, the hybrids supported more than 55 per cent. as many needle infections per unit sample and over 30 per cent. more bark cankers than did *P. monticola* progenies. However, it appears from the resistance displayed by one of the hybrids that more F_1 progenies possessing this character might be produced. Among four *P. monticola* parents included in the tests, one with proved ability to transmit resistance to its intraspecific offspring also transmitted resistance to a hybrid.

Van Arsdel (E. P.), Riker (A. J.), & Patton (R. F.). **The effects of temperature and moisture on the spread of White Pine blister rust.**—*Phytopathology*, 46, 6, pp. 307–318, 2 diags., 3 graphs, 1956.

Some of the information in this important study on the relation of environmental conditions to the spread of white pine blister rust (*Cronartium ribicola*) [see next abstract] in Wisconsin has already been noticed [34, p. 4]. On inoculated plants of black currant, *Ribes cynosbati*, *R. americanum*, *R. hirtellum*, and *R. missouriense*, uredospores developed at day temperatures ranging from 16° to 28° and night from 2° to 20° C., but not when a temperature of 35° prevailed during a five- to seven-hour day. In general, 20 days at 35° sufficed to prevent subsequent sporulation of the rust, and sometimes the same result was achieved with 10 days.

A fortnight of suitable temperatures was requisite for fertile teleutospore production, which was inhibited by 20° at night and 35° by day. Teleutospores formed on wild *Ribes* plants in the field during a three-week period of temperatures ranging from 15° to 25° were practically sterile, whereas those that developed in a week of less than 20° temperature were fertile. In one location a three-day period with diurnal maxima of 28° to 32° and a night range of 8° to 18° was long enough to cause sterility. High temperatures also inhibited germination of previously formed spores, the risk of infection being eliminated for a further seven to eight days, for instance, by five days at 35°. For teleutospores formed at a constant temperature of 16° a period of 42 to 48 hours was necessary for sporidial production and germination, but the substitution of a nocturnal temperature of 2° expedited the processes so that 36 hours sufficed.

Production of fertile teleutospores in quantity needs a fortnight with no three consecutive days over 28°, and a subsequent 48 hours of saturated air below 20° is required for infection of pine. Lack of these conditions is the principal factor limiting blister rust spread in the State.

Hirt (R. R.). **Fifty years of White Pine blister rust in the Northeast.**—*J. For.*, 54, 7, pp. 435–438, 3 figs., 1956.

The history of the white pine blister rust (*Cronartium ribicola*) [see preceding abstract] development in north-east America during the past 50 years is traced. About 1900, to augment planting material, white pine (*Pinus strobus*) seedlings were introduced from Europe and brought the disease. The rust, found on *Ribes* in New York in 1906, was first recorded on *P. strobus* in the north-east in 1909 (and was introduced into the north-west in 1910). There were severe outbreaks in

western Massachusetts in 1915. The Federal Plant Quarantine Act of 1912 prohibited further importations from Europe of white pine seedlings, but many millions had already been introduced. The earliest attempts at eradication of infected *Ribes* date back to 1908 in New York and this has remained the basis for control [34, p. 455]. Recently, chemical spraying of *Ribes* spp. has replaced hand-pulling under certain conditions, and successful tree surgery practices have been developed [35, p. 562], but control is recognized as impracticable in certain areas. Increasing attention is being directed to rust resistance [35, pp. 335–6]. The control area in the New England States covers some 11,000,000 acres, 4,000,000 of which support white pine worthy of protection, and the disease has not destroyed white pine as a forest tree.

HENRY (B. W.). **Basal branches no symptom of fusiform rust on Slash Pine seedlings.**—*Tree Plant. Notes* 24, 16 pp., 1956. [Abs. in *For. Abs.*, 17, 4, p. 554, 1956.]

Contrary to the belief held by American nurserymen, it has been shown by tests that the presence of basal branches on seedlings of *Pinus elliottii* is not an infallible sign of infection by *Cronartium fusiforme*.

LEAPHART (C. D.). **Physiological studies of some fungi associated with pole blight of Western White Pine.**—*Mycologia*, 48, 1, pp. 25–40, 1 graph, 1956.

Certain isolates of *Leptographium* sp. from western white pine trees (*Pinus monticola*) affected by pole blight [31, p. 306; 33, p. 456; 35, p. 647] in the United States are highly parasitic; others are less so, and yet others are unable to parasitize living bark tissues. At the Intermountain Forest and Range Experiment Station, Ogden, Utah, a study was made of the temperature, pH, vitamin, carbohydrate, and nitrogen requirements of four unnamed isolates of *Leptographium*, all morphologically similar to *L. lundbergii*, and one of *Ceratocystis pilifera* from affected trees.

It is concluded that differentiation between the *C. pilifera* isolate and the *Leptographium* isolates studied may be possible, based on their respective ability or inability to utilize certain carbon or nitrogen compounds. This basis is not likely, however, to be of practical use in distinguishing between the *Leptographium* isolates. Of these, the non-parasitic form differed from the others mainly in its sensitivity to high temperatures and in its vitamin requirements.

VON HENNIGS. **Beobachtungen zur Kiefernschütte 1955.** [Observations on Pine needle-cast 1955.]—*Forst- u. Holzw.*, 11, 1, pp. 100–102, 1956.

This is a discussion, with special reference to local conditions in the Lüneburg Heath district of Germany, of the influence of environmental and silvicultural factors on the development of pine needle-cast [*Lophodermium pinastri*: 35, p. 563], which assumed an epiphytotic form in 1955. The efficacy of control by spraying, e.g., with Bordeaux mixture or dithane, depends entirely on correct timing. The operation should coincide with the ripening of the apothecia on fallen needles, which constitute the source of infection, and a repetition should be generally unnecessary if the treatment is deferred until the main body of the fructifications reaches maturity. The activity of the fungicides persists for about six weeks, according to the amount of rainfall. For instance, 70 mm. washes off enough dithane with adhäsit (a sticker for which the need varies with the hardness of the water) to necessitate a second application. The 'prophylactic' treatment, e.g., of one-year-old stands, is pointless since there is as yet no infection focus of old needles.

Georgescu (C. C.) & Zaharia (Elena). **Contribuții la cunoașterea bolilor de inroșine și scuturare a acelor de Molid și Jenuper, cauzate de specii de Lophodermium.** [Contributions to the study of pustule disease and needle fall of Spruce and Juniper caused by species of *Lophodermium*.]—*Rev. Pădurilor*, 68, 12, pp. 16–19, 7 figs., 1953. [Russian summary.]

Lophodermium macrosporum [cf. 33, p. 456] and *L. abietis* attacked three- and particularly four-year-old spruces in nurseries situated 1,000 m. above sea-level and five- to ten-year-old ones in plantations in Romania. The disease appears in the form of pustules on the needles and induces them to fall. A series of control measures is recommended.

L. juniperinum [cf. 30, p. 382], a new record for Romania, is reported on needles and annual shoots of juniper (*Juniperus communis*).

Magnani (G.). **Disseccamento di piante adulte di Cupressus macrocarpa.** [Canker of adult plants of *Cupressus macrocarpa*.]—*Monti e Boschi*, 7, 4, pp. 184–185, 1956. [Abs. in *For. Abs.*, 17, 4, p. 553, 1956.]

The occurrence of *Coryneum cardinale* [35, p. 498] on *Cupressus macrocarpa* in the Pontine marshes, Italy, is noted. The susceptibility of other *Cupressus* spp. is being investigated.

Benzian (B[lanche]) & Warren (R. G.). **Copper deficiency in Sitka Spruce seedlings.**—*Nature, Lond.*, 178, 4538, pp. 864–865, 1956.

Sitka spruce seedlings in the Forestry Commission Research Nursery, Sugar Hill, Wareham, Dorset, have suffered from a needle tipburn for several years, but affecting only vigorously growing seedlings during dry hot spells in midsummer. The tips of the upper needles shrivel and turn straw-coloured, a distinct break forming between the normal green lower part of the needle and the withered tip. In prolonged hot, dry weather the growing point may die, but the return of moist conditions is followed after a short spell by the production of normal needles. Needle tipburn is common on seedlings grown with inorganic fertilizers but rarely observed in seedbeds treated with compost.

Sitka spruce seedlings grown with inorganic fertilizers and sprayed with 0·5 per cent. copper (as copper sulphate) were 50 per cent. taller and had a 40 per cent. increase in copper content compared with the untreated, although needle tipburn was not entirely eliminated. In another experiment a comparison was made between the growth of Sitka spruce seedlings on plots treated with a standard inorganic fertilizer and those with a compost made from bracken and hop waste. On the compost plots there was no tipburn while it was severe on the fertilizer plots. An analysis revealed that the copper content of bracken was 10 p.p.m. and that of hop waste 1,000 p.p.m.

Lyr (H.). **Zur Frage der Widerstandsfähigkeit des Kernholzes erkrankter und gesunder Douglasien gegenüber holzzerstörenden Pilzen.** [On the question of the resistance of diseased and healthy Douglas Fir heartwood to wood-destroying fungi.]—*Arch. Forstw.*, 5, 1–2, pp. 96–103, 1956.

At the Institute for Forest Botany, Eberswalde, Germany, using the standard wood-block method, the author tested the reactions to nine wood-destroying fungi of the heartwood of a healthy green (*viridis*) and of one blue (*caesia*) and two grey (*glauca*) forms of Douglas fir [*Pseudotsuga taxifolia*] infected by *Rhabdocline pseudotsugae* [36, p. 74]. Comparable samples of pine and spruce were used as controls.

The green Douglas fir was uniformly more resistant than pine, but the differences were significant only for *Phellinus* [*Fomes*] *pini*, *Lentinus lepideus*, *F. annosus*, *Lenzites saepiaria*, and possibly *Coniophora cerebella* [*C. puteana*]. Spruce was the

most susceptible to nearly all the species used. The blue and grey forms of Douglas fir attacked by *R. pseudotsugae* reacted similarly to infection by the various lignicolous fungi, to which they were definitely less resistant than the healthy green. The differences were statistically significant in respect of *F. pini*, *L. saepiaria*, *Lentinus lepideus*, and *F. annosus*. Compared with pine heartwood, the diseased blue and grey specimens of Douglas fir were more resistant only to *F. pini* and *L. lepideus*.

De Ferré (Y[vette]). **Les Pseudotsuga de l'Arboretum de Jouéou et leur résistance au Phaeocryptopus.** [The Pseudotsugas in the Arboretum of Jouéou and their resistance to *Phaeocryptopus*.]—*Bull. Soc. Hist. nat. Toulouse*, 90, 1–2, pp. 129–134, 1955.

The severity of *Phaeocryptopus gaeumanni* [map 42] on *Pseudotsuga* spp. in the arboretum of Jouéou, French Pyrenees, was greatly aggravated in 1953 by the favourable conditions for the pathogen prevailing during the preceding winter, when a persistent snow-cover was accompanied by fine weather, resulting in considerable radiation and chilling of the soil with a consequent disturbance of the relations between absorption and transpiration. Observations on the reactions of various species, using the classification of Mlle F. Flous (*Bull. Soc. Hist. nat. Toulouse*, 71, pp. 33–164, 1937), confirmed the well-known susceptibility of *P. glauca*. *P. rehderi* and *P. guinieri* were also susceptible, while the two specimens of *P. merrilli* were immune. Marked differences in resistance characterized the five specimens of *P. caesia* and 29 of *P. douglasii* [*P. taxifolia*: cf. 34, p. 6]. In the latter case there was no connexion between the response to infection and geographical origin. At least one line, comprising three 15-year-old trees ranging from 6·4 m. to 7·65 m., appeared to be completely resistant.

[This paper also appears in *Trav. Lab. for. Toulouse*, 6, 4, pp. 1–6, 1955.]

Gill (L. S.) & Andrews (S. R.). **Decay of Ponderosa Pine slash in the southwest.**—*Res. Note Rocky Mt. For. Range Exp. Sta.* 19, 2 pp., 1956. [Abs. in *For. Abs.*, 17, 4, p. 552, 1956.]

In Arizona and New Mexico ponderosa pine [*Pinus ponderosa*] is attacked principally by *Polyporus anceps* [34, p. 498], causing a red rot in living trees, and also by *P.* [*Polystictus*] *abietinus* and *Lenzites saepiaria*. Standing tops are decayed very rapidly by *P. anceps* and do not produce sporophores, but scattered or piled slash decays less rapidly and is favourable for fruit body production and encourages *L. saepiaria*.

Fenton (R. H.) & Berry (F. H.). **Heart rot of Virginia Pine in Maryland.**—*For. Res. Note Ntheast. For. Exp. Sta.* 56, 4 pp., 1956. [Abs. in *For. Abs.*, 17, 4, pp. 551–552, 1956.]

The use of external indicators in assessing the presence of heart rot [unspecified] and the expected loss is discussed on the basis of data from 168 Virginian pines [*Pinus virginiana*] and 382 logs from them. In an examination of several hundred stumps in a 40-year-old stand cut for pulp wood only one showed any sign of heart rot.

Ference (G. M.) & Gilles (T. L.). **The deterioration of straw-piled pulpwood.**—*Tappi*, 39, 6, pp. 406–415, 15 graphs, 1956.

At the Brunswick Pulp & Paper Co., Brunswick, Georgia, storage of unpeeled pine, red oak, and gum [? *Liquidambar styraciflua*] was initiated on 1st April (midspring), 15th July (midsummer), and 1st November (early winter). The wood

was held in straw piles for six months (eight in the case of the early winter samples) and examined at regular intervals for evidence of decay.

After about one month 5 per cent. (by volume) of the April-stored pine wood was blue-stained [by unspecified fungi] and engraver beetles (*Ips* spp.) had begun activity. By the end of the second month about 12 per cent. of the wood was stained and most of the bark and cambium had been eaten by the beetles. White rot (*Peniophora gigantea*) developed during the third month, inducing a brown discoloration that partially obliterated the blue stain. Its sporophores and those of *Schizophyllum commune* were present on most of the bolts. The brown areas gradually extended and the wood assumed a soft, spongy consistency; by the sixth month it was so friable that whole cross sections could be cut only rarely. The July-stored pine showed about 15 per cent. blue stain at the end of the first month, while *P. gigantea* and *S. commune* developed during the second. The white rot continued to spread and after six months the state of the samples was similar to the foregoing. Blue stain was negligible in the November bolts until the fourth month, when it affected some 25 per cent. At the same time the brown discoloration due to *P. gigantea* began to develop and the first sporophores were seen. By the end of six months all the wood was stained either blue or brown, but during the seventh the latter discoloration became predominant and the wood was extensively softened. After eight months' storage deterioration was very severe.

April-stored oak developed a high incidence of brown stain during the first and second months. The discoloration was immediately followed by the formation of black, zonate lines, characteristic of many [unnamed] white rots. The grey, papery sporophores of a species of *Nummularia* appeared after three months within and below the cortical layers, but its part, if any, in the causation of decay is not known. By the fourth month the sapwood seemed to be on the point of disintegrating, while some of the heartwood was also infected. Deterioration proceeded during the next two months. Extensive staining developed during the first month in the July-stored samples, while zonate lines appeared in proximity to the large vessels. The cambium was dry on all the bolts. Decay was rapid during the second month and the *N.* sporophores were observed at the end. By the sixth month the heartwood of many bolts was rotted. The November-stored oak remained fairly sound until the fourth month, but by the end of six months the sapwood had softened. The *N.* sporophores were detected under the bark at this stage and continued to develop while the sapwood decayed during the next two months.

Staining of April-stored gum developed during the second month and the zonate lines of the white rots in the fourth, by which time the wood had deteriorated badly. During the fifth month the decay continued, mycelial mats appearing on the wood surface under the bark. On drying at the end of six months the soft, spongy wood was very brittle and light in weight. Staining of the July-stored samples began during the first month and proceeded at a fairly even rate until the sixth, at the end of which the material was very soft and full of zonate lines. After four months the November-stored bolts were extensively stained, by the end of five they had sustained appreciable damage, and they were in very poor condition after six. Further decay during the next two months resulted in softening and a spongy consistency. Mycelial mats had been formed under the bark by the end of the eighth month.

In general, the maximum reductions in specific gravity occurred from July to September, inclusive, and the minimum between November and January. Continued decay of the pulpwood resulted in heavy reductions of tearing strength in the bleachable grades of sulphate pulp produced from the three types of wood. Pulp yield on a dry wood basis decreases with a rising incidence of decay, especially in pine, and more alkali is required to cook rotted than fresh wood to the same permanganate number.

MOOK (P. V.) & ENO (H. G.). **Relation of heart rots to mortality of Red Spruce in the Green Mountain National Forest.**—*For. Res. Note Ntheast. For. Exp. Sta.* 59, 2 pp., 1956. [Abs. in *For. Abs.*, 17, 4, p. 551, 1956.]

In a survey of over-mature (average age 259 years) red spruce [*Picea rubens*] growing at a high altitude [in the United States], only 6·3 per cent. of the total volume was decayed [unspecified] although over 60 per cent. of the trees had some decay. It was concluded that the mortality over the past few years was due rather to age and unfavourable environment.

GEWECKE (H.). **Sap replacement pole treatment. Mobile treating plant for green poles of Spruce, Pine, Fir and other species of wood.**—*Elect. News*, 65, 12, pp. 108–110, 7 figs., 1956.

From Wiesbaden, Germany, the author outlines a method of wood preservation against [unspecified] fungi and insects based on the principle of sap replacement by an aqueous solution of salts under vacuum pressure [21, p. 235 and next abstract], the apparatus for creating which is described. The concentration of the chemical regulates its absorption by the wood. The proportion of sapwood in spruce, fir [*Abies* spp.], and pine is roughly 60 per cent. of the total wood volume. Reckoning the sap content of 1 cu. ft. wood as 2·3 gals., its replacement by a 1·5 or 2·5 per cent. solution would involve the absorption of 0·35 or 0·45 lb., respectively—many times more than the quantity required to kill the pathogens. About 175 gals. water are necessary for the treatment of 700 cu. ft. wood, representing some 100 telephone poles 25 ft. in length. Approximately 10 per cent. of the cell cavities of the sapwood, equivalent to another 25 cu. ft., are filled with air, which also has to be replaced by the chemical in the process of impregnation.

Holzschutz. Veröffentlichungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft. Institut für forstliche Mykologie und Holzschutz Hann.-Münden. [Timber protection. Publications of the Federal Biological Institute for Agriculture and Forestry. Institute for Silvicultural Mycology and Timber Preservation Hann.–Münden.]—*Mitt. biol. ZentAnst. Berl.* 86, 63 pp., 4 figs., 3 diags., 8 graphs, 1956.

This bulletin comprises three papers, the first by A. KÖRTING (pp. 3–32) dealing with the quantitative determination of fluoride in wood by Schuch's method [32, p. 654] as a possibility for the evaluation of practical measures for timber protection in the building industry; the second, by H. ZYCHA and F. HERBOLD (pp. 33–48), with the uptake of protective salts by spruce poles in impregnation by the sap displacement method [see preceding abstract]; and the third, by H. ZYCHA and W. HÄRTE (pp. 49–63), with the question of timber impregnation with copper sulphate [34, p. 198 *et passim*].

REED (L. B.) & DOOLITTLE (S. P.). **Insects and diseases of vegetables in the home garden.**—*Home Gdn Bull.* 46, 64 pp., 5 pl. (4 col.), 44 figs., 1955. [Received 1956.]

This popular survey by the United States Department of Agriculture, fully indexed and illustrated, of the principal pests and diseases of vegetable garden crops and of the dusts and sprays recommended for their control, supersedes the previous publications of that Department on the subject [25, p. 483].

MARLATT (R. B.). **Susceptibility of some vegetables to streptomycin injury.**—*Plant Dis. Reptr*, 40, 3, pp. 200–201, 1956.

Greenhouse studies at the Arizona Agricultural Experiment Station, Mesa, on the reaction of 14 different vegetables to streptomycin at concentrations of 1 in 1,000,

1 in 100, and 1 in 25 showed that celery and radish were particularly susceptible to injury, developing severe chlorosis after the 1 in 25 spray. Peas, peppers [chilli: 35, p. 413], and watermelons showed complete tolerance. Symptoms were generally most severe six to eight days after spraying. Recovery was usually prompt, though celery, radish, and lettuce were slow to recover from the 1 in 25 spray.

Stunting and chlorosis were still evident in radish a month after spraying; celery regained its green colour after 20 days but the sprayed leaves remained rugose.

New vegetable varieties. List III.—*Proc. Amer. Soc. hort. Sci.*, 67, pp. 587–609, 1956.

In this third list [cf. 35, p. 59] are included all the varieties of vegetables introduced by North American federal and State institutions, trade organizations, and private individuals since 1936.

Among the newer varieties reported to possess disease resistance are the cucumbers Ashley and Stono, resistant to downy mildew [*Pseudoperonospora cubensis*: 35, p. 72] and released in 1956. Also released during 1956 were the pea varieties Eureka (canning type), Midfreezer, and Small Sieve Freezer (freezing types) resistant to *Fusarium* wilt [*F. oxysporum* f. *pisi*: 35, p. 649]. The pea Thriftigreen, released in 1953, is stated to possess resistance to most pea diseases. Resistance to *Fusarium* [*bulbigenum* var. *lycopersici*: 35, p. 60] is claimed for the tomato varieties Homestead No. 2 (released in 1955), Solid Red Strain B (1955), Golden Marglobe (1956), and Texto 2 (1956). The last variety is also resistant to the collar rot phase of *A*[*lternaria*] *solani* [34, p. 824] and partially resistant to blossom-end rot and stem cracking.

Roll-Hansen (J.). **Beising av grønnsakfrø. Forsøk i årene 1944–54.** [Disinfection of vegetable seed. Experiments during the years 1944–54.]—*Meld. PlPat. Inst., Oslo*, 10, 69 pp., 4 figs. (1 col.), 1956. [English summary.]

Anthracnose (*Colletotrichum lindemuthianum*) is generally regarded as the principal disease of beans (*Phaseolus vulgaris*), but in Norway blotch (*Ascochyta hortensis*) [25, p. 185] is equally important and may be very destructive. The origin of the rust-coloured blotches on white seeds is readily determinable by the presence of black areas in those due to *C. lindemuthianum* and their absence from those induced by *A. hortensis*, which are usually surrounded by a vivid green zone.

In 1945 significant results were obtained in an experiment in which seed stocks were sorted into four groups, viz., disease-free, slightly brown, and with (*a*) small and (*b*) large fungal blotches. The yields (in kg.) per 10 ares [1 are = 119·6 sq. yds.] were 1,281, 966, 946, and 794, respectively, and the percentages of infected pods 1·5, 4·8, 11·9, and 21·7, respectively. Spraying with a copper-containing fungicide did not materially increase production over a period of several years. Although the results of laboratory tests did not indicate any improvement in the germination of seed treated with ceresan (liquid and dust), granosan, panogen, phygon, or spergon, seedling emergence in the field was often much better after disinfection, increasing for instance from 50·4 to 70·7 per cent. in the case of Alabaster seeds with large blotches caused by *A. hortensis*.

Summing up the outcome of the ten years' trials, the author concludes that the raising of disease-free seed-bean crops presents great difficulties in Norway. Even after seed treatment and four applications of a fungicide, the incidence of infection in a crop grown in soil not used for beans for many years was nearly 10 per cent.

In 1947 the dusting of sugar pod pea seed with phygon and spergon (both at a dosage of 3 gm. per kg.) raised the germination capacity in soil from 12 to 94 and 95 per cent., respectively, and that of marrowfats from 31 to 82 and 56 per cent.,

respectively. It is noted that the phygon preparation used in the tests contains 97 per cent. of the active ingredient dichlone compared with 50 per cent. in commercial phygon XL. The marrowfats harvested in this test were stored in paper bags until 1954 with only a slight reduction (3 to 5 per cent.) of germination capacity. In 1949, when seeds of the same lot were tested for emergence in the field, the increases from phygon and spergon were only 4 and 5 per cent., respectively, compared with 82 and 83 per cent., respectively, in 1947. These figures clearly illustrate the variability in the results of seed treatment in different years. In another experiment marrowfats harbouring 16 per cent. infection by *A. pisi* were treated with phygon XL and 0·25 per cent. ceresan (half-an-hour's immersion) and planted in steamed or unsteamed soil in the greenhouse. In the unsteamed flats phygon XL increased the germination percentage from 20 to 85 per cent. and in the steamed from 77 to 83. In steamed soil *A. pisi* was the only seed-borne fungus responsible for damping-off, which in the unsteamed was also associated with *Colletotrichum* and *Fusarium* spp. and *Rhizoctonia* [*Corticium*] *solani*. Ceresan produced only a slight increase in germination (27 per cent.) in unsteamed soil and none in steamed.

In tests in 1953 and 1954 with Amsterdam forcing and outdoor carrots, both the last-named fungicides reduced the incidence of seedling infection by *Stemphylium radicinum* from 10 and 13 per cent., respectively, to nil. They were also effective in increasing the emergence of seed with 14 per cent. infection by *S. radicinum*. Thus, in unsteamed soil both raised the percentage from 44 to 67, while in steamed the increase for phygon was 55 and for ceresan 51 per cent. The incidence of damping-off in two trials was reduced in unsteamed soil from 18 and 9 to 7 and 3 and to 2 and 1, respectively, by the two fungicides, and in steamed from 39 and 27 to 5 by both, and to 3 and 2, respectively.

In various tests on kale, cabbage, and Brussels sprouts seed treatment was of little use in unsteamed soil, but in steamed it reduced damping-off by about half. In steamed soil infection was caused by the seed-borne fungi *Phoma lingam* and *Alternaria brassicicola*, whereas soil-borne organisms, especially *C. solani*, were mainly responsible in unsteamed [cf. 32, p. 412].

Mercurials gave the best control of *Pleospora betae* on red beet; in one test täyssato [32, p. 413] was significantly superior to any of the other preparations used.

King of Denmark spinach seed with 16 per cent. infection by *Colletotrichum spinaciae* was treated with phygon XL or liquid ceresan and grown in plots of unsteamed or steamed soil. Germination was increased by both treatments in the unsteamed series from 34 to 83 per cent., but neither conferred adequate protection against damping-off, caused exclusively by *C. spinaciae* in the steamed plots; in the unsteamed *Fusarium* and *Pythium* spp. and *Corticium solani* were also concerned.

Kole (A. P.) & Philipsen (P. J. J.). **Over de vatbaarheid van niet-kruisbloemige planten voor het zoösporangium-stadium van Plasmodiophora brassicae Woron.** [On the susceptibility of non-cruciferous plants to the zoosporangial stage of *Plasmodiophora brassicae* Woron.]—*Tijdschr. PlZiekt.*, 62, 4, pp. 167–170, 6 figs., 1956. [English summary.]

Of 19 species of non-cruciferous plants inoculated with *Plasmodiophora brassicae* at the Agricultural College, Wageningen, Holland [35, p. 500], only four contracted infection, namely, *Papaver rhoeas*, *Reseda odorata*, *Lolium perenne* (as already reported by MacFarlane [32, p. 3]), and red clover. Except in *P. rhoeas* the symptoms were very mild and even this host was less severely attacked than cabbage. It is consequently inferred that little practical importance need be attached to the existence of non-cruciferous hosts [34, p. 564] of club root.

Martini (C.). **Eine Herkunft des Blumenkohlmosaikvirus (Cauliflower mosaic virus) aus der Umgebung von Bonn.** [A source of the Cauliflower mosaic virus from the vicinity of Bonn.]—*Z. PflKrankh.*, 63, 10, pp. 577–583, 3 figs., 1956. [English summary.]

In September, 1955, the characteristic symptoms of cauliflower mosaic virus were observed on white cabbage plants in the outer rows of a stand at Bonn-Endenich, Germany [cf. 19, p. 508]. Identification was based on the thermal death point of 80° C.; restriction to crucifers (cauliflower, Chinese cabbage, turnip, and rape) in inoculation tests; and modes of transmission (mechanical and by means of the aphids *Myzus persicae*, *M. ascalonicus*, *M. circumflexus*, *Rhopalosiphoninus tulipaella* [*R. staphyleae*], and *Aphis fabae*).

Jenkinson (J. G.). **The incidence and control of Cauliflower mosaic in Broccoli in south-west England.**—*Ann. appl. Biol.*, 43, 3, pp. 409–422, 5 graphs, 1955.

In experiments carried out in Devonshire from 1950 to 1952, inclusive, on the control of cauliflower mosaic virus [35, p. 147] in Extra Early, A6, B1, DK7, and Late Angers of Roscoff broccoli, yields were significantly increased by using plants raised in seed-beds situated at least half a mile away from old, infected plants. The evidence obtained showed that a plant infected in the seed-bed or early in the season may produce a group of infected plants immediately round it and almost as many farther away, and each secondarily infected plant may serve to spread infection similarly if satisfactory conditions prevail for flight by aphids, of which *Myzus persicae* and *Brevicoryne brassicae* appear to be mainly responsible for spread in the field. The yield of plants infected as they approach maturity is but little affected.

Even in a district where the disease is prevalent, the incidence of mosaic at harvest largely depends on the incidence at planting. As the date of infection and yield of curd are correlated, seed-bed infections produce the greatest losses of yield and also provide sources of virus for early spread in the field crop.

Barrier crops [35, p. 150] proved effective and should always be used. In south-western England at least two strains of the virus are present. One causes vivid symptoms and greatly reduces the size of the plants. The other produces a pale yellowing of the veins of some or all of the leaves, which often disappears for two or three weeks, to reappear on the younger leaves. It has little effect on plant size.

The raising of healthy seedlings does not necessarily prevent losses; the migration of aphids from early infected plants immediately after the experiment began caused 62 per cent. of the plants from the isolated seed-bed to become infected by January, 1953; no difference in size was apparent between plants from isolated and non-isolated seed-beds. Such early and extensive spread, however, would probably occur only when broccoli is grown in small plots surrounded by infected plants.

Robinson (D. B.) & Campbell (J. E.). **Whiptail of Cauliflower in Prince Edward Island.**—*Canad. J. agric. Sci.*, 36, 3, pp. 241–244, 1 pl., 1956.

Whiptail of cauliflower, due to molybdenum deficiency [cf. 35, p. 148] and associated with highly acid soils which have received heavy applications of commercial fertilizer, occurs regularly in most market gardens of Prince Edward Island. It was corrected by adding 6 to 16 oz. of molybdenum per acre to the soil or 1 to 12 oz. per acre in foliar sprays [cf. 29, p. 393].

Fry (P. R.) & Jacks (H.). **Effect of foliar and soil applications of insecticides on control of aphids and Turnip-mosaic virus on Swedes.**—*N.Z.J. Sci. Tech.*, Sect. A, 38, 2, pp. 120–123, 1956.

In field trials at the Plant Diseases Division, Auckland, New Zealand, spray applications of lindane (0·025 per cent.), parathion (0·024), schradan (0·35), and

TEPP (0·025), and soil treatments with schradan all significantly reduced the incidence of turnip mosaic virus in swedes [33, p. 140], the most effective being parathion at intervals of seven days with a reduction from 44·5 per cent. (sprayed with water) to 33. The high toxicity of many insecticides should be carefully considered before application to crops intended for stock or human consumption.

Cosentino (V.), Paigen (K.), & Steere (R. L.). **Electron microscopy of Turnip yellow mosaic virus and the associated abnormal protein.**—*Virology*, 2, 2, pp. 139–148, 1 pl., 1 fig., 1 graph, 1956.

The authors describe methods used at the University of California, Berkeley, for the purification and separation of virus nucleoprotein and associated abnormal protein from Chinese cabbage (*Brassica pe-tsai*) infected with turnip yellow mosaic virus [see next abstract]. The nucleoprotein was isolated and concentrated by a butanol-chloroform fractionation procedure. Abnormal protein was separated by density gradient centrifugation from the virus nucleoprotein of purified mixtures obtained by the use of either an ethanol-ammonium sulphate or an ethanol-differential centrifugation procedure. Virus nucleoprotein contained 34 per cent. ribonucleic acid and was infectious at a concentration of 4×10^{-6} mg. per ml. By electron micrography the nucleoprotein particles were seen to be rigid and nearly spherical, having a diameter of 26 mμ, while those of the abnormal protein were either flattened (up to 36 mμ) or clumped together and dimpled (26 mμ).

Matthews (R. E. F.). **Infectivity of Turnip yellow mosaic virus containing 8-azaguanine.**—*Virology*, 1, 1–3, pp. 165–175, 1 graph, 1955. [Received November, 1956.]

In work at the Plant Virus Research Unit, Molteno Institute, Cambridge, treatment with 8-azaguanine retarded the development of turnip yellow mosaic virus [34, p. 133] in small Chinese cabbage plants. The infectivity of virus preparations containing this substance was lower than that of normal preparations containing the same amount of virus nucleic acid.

A method of estimating virus protein in heat-clarified plant sap is described, based on the time required for visible precipitation to occur in the region of antiserum excess, with twofold dilutions of virus and a constant dilution of antiserum. This method gives more accurate estimates than methods involving optimum proportions or end-point determinations.

Gerhold (N. R.). **Sugar Beet diseases and their control.**—Abs. in *Iowa St. Coll. J. Sci.*, 30, 3, p. 362, 1956.

Laboratory, greenhouse, and field tests on the control of pre- and post-emergence damping-off of sugar beet caused by five isolates of *Rhizoctonia* [*Corticium*] *solani* [35, p. 411] and one of *Pythium ultimum* were made at the Agricultural Experiment Station, Ames, Iowa; different varieties were evaluated in the field for susceptibility to *Fusarium oxysporum* f. [*F. conglutinans* var.] *betae* [35, p. 260]. Three strains of *C. solani* were identified. Maneb at 100 p.p.m. inhibited mycelial growth of *C. solani* and *P. ultimum* in culture and at 8 oz. per 100 lb. seed it effectively controlled pre-emergence damping-off in laboratory and greenhouse. In soil at depths of 0·5, 1, and 1·5 in. it was more effective against *P. ultimum* than as a seed treatment.

Thiram and zineb applied in the row at planting time at 4 lb. per acre significantly increased the stand of seedlings over the untreated control, and maneb seed treatment in conjunction with a soil application of a maneb-vermiculite mixture at planting time had a similar effect against *F.c.* var. *betae*, which copper sulphate at 25 lb. per acre in irrigation water failed to control. The variety GW 359 was the most resistant to the *Fusarium* and the yield of B 626 was the highest per acre, though not significantly higher than that of its parent C 359 or B 589.

Drachovská-Šimanová (Miroslava). **Řepne virosy a jejich přenašeči.** [Beet viruses and their vectors.]—198 pp., 8 col. pl., 50 figs., 1 diag., 1 graph, State Agricultural Publishing-House, Prague, 1955. 37,20 Kčs.

This book is based on eight years of intensive studies on viruses affecting table and sugar beets in Czechoslovakia [cf. 33, p. 132], where they cause severe losses to these crops and impair the vigour of the seed. The book is divided into five parts, Part I (pp. 8–54) dealing with yellows viruses; II (pp. 55–82) beet mosaic viruses; III (pp. 83–96) determination and forecasting the appearance of viruses; IV (pp. 97–122) protection against beet yellows and mosaic viruses; and V (pp. 123–141) sugar beet curly top virus. A complete bibliography of virus diseases and their vectors is appended (pp. 147–192). The book is intended to acquaint research and field workers with these viruses and thus facilitate their identification and control. Symptoms, spread, damage caused, and control are all described, the last calling for improvement in the existing measures and the cooperation of entomologists in identifying unknown vectors.

Reitberger (A.). **Ruhekernuntersuchungen bei gesunden und viruskranken Diploiden und Polyploiden von Beta vulgaris.** [Studies on the resting nucleus in healthy and virus-diseased diploids and polyploids of *Beta vulgaris*.]—*Züchter*, **26**, 4–5, pp. 106–117, 26 figs., 1956.

It was observed in the course of intensive studies at the Rosenhof branch of the Max Planck Institute for Breeding Research, Ladenburg-am-Neckar, Germany, on the resting nuclei of the leaf blade epidermis of 14 di- and polyploid varieties and some selections of sugar beet, two varieties each of fodder and red beet, and one of mangold that the immediate response to infection by beet mosaic virus is an enlargement of the nucleolus. The next step is the development of an inlet, caused by a vacuole which may become detached, whereupon the nucleolus resumes its original spherical form. No alterations in nuclear structure were detected in the leaf blade epidermis of beets infected by yellows virus.

Beiss (U.). **Untersuchungen über den Wirtspflanzenbereich der Vergilbungsvirus der Beta-Rüben (Corium betae).** [Studies on the host plant range of the yellows virus of *Beta* Beets (*Corium betae*).]—*Phytopath. Z.*, **27**, 1, pp. 83–106, 1956.

Some of the information in this comprehensive study on the host range of beet yellows virus in Germany [35, p. 741] has already been noticed from another source [35, p. 60]. The virus was shown to be transmissible from diseased to healthy beets by means of the dodder *Cuscuta gronovii*. Five of the seven weeds previously listed as hosts of yellows [loc. cit.] were also found to harbour beet mosaic virus [36, p. 77], the exceptions being *Polygonum convolvulus* and *Atriplex nitens*. Although *Plantago major* was definitely injured by infection with the yellows virus, attempts to reinoculate beets with material from this source, either mechanically or by means of the aphid *Myzodes* [*Myzus*] *persicae*, gave negative results.

The existence of different 'strains' of the yellows virus [cf. 35, p. 570] was confirmed by the differential action of five isolates on the dry matter yield of *Capsella bursa-pastoris* and *P. major*, and on the seed yield and ash and nitrogen contents of the former. Only mild symptoms developed on beets reinoculated with various isolates after passage through *C. bursa-pastoris* and *Thlaspi arvense*. An attenuated isolate from the latter host showed no sign of alteration in the symptoms it induced during repeated passages through beet plants, suggesting that it consists of few components, possibly only one.

In a discussion on the potential significance of weeds in the maintenance and spread of beet yellows virus it is pointed out that extensive field experiments are essential for final elucidation. Although most of the hosts are annuals, *C. bursa-pastoris*, *T. arvense*, *Papaver rhoeas*, and *Senecio vulgaris* can produce several

generations during a growing season and overwinter in a vegetative state; they may therefore serve as dangerous foci of infection in the event of early aphid movement, and it has been shown that the weeds in question are used as food sources by *M. persicae*. The possibility of dodder transmission may be disregarded for central and north Germany, where this form of parasitism is exceedingly rare. However, according to a verbal communication from Schlösser, it is prevalent in northern Italy and Yugoslavia.

Ernould (L.). **Ergebnisse bei der Bekämpfung der Vergilbungskrankeit der Rübe mit systemischen Insektiziden in Belgien.** [Results in the control of Beet yellows disease with systemic insecticides in Belgium.]—*Zucker*, 9, 20, p. 505, 1956.

This is a summary of the author's recent extensive studies on beet yellows virus control by spraying with systox and other systemic insecticides in Belgium, a notice of which from the original source has already appeared [35, p. 570].

Keyworth (W. G.), Howell (J. Sheila), & Dowson (W. J.). **Corynebacterium betae (sp. nov.), the causal organism of silvering disease of red Beet.**—*Plant Path.*, 5, 3, pp. 88–90, 1956.

Corynebacterium betae n.sp., causing silvering of red beet [33, p. 6; 36, p. 4], is described. Though similar to *C. michiganense*, it differs in its colour on agar, forming pale yellow, transparent colonies on yeastrel-glucose and meat-infusion glucose yeast agars. It also failed to infect tomato or potato stems.

Yen (D. E.) & Fry (P. R.). **The inheritance of immunity to Pea mosaic virus.**—*Aust. J. agric. Res.*, 7, 4, pp. 272–280, 1 pl., 1956.

In studies conducted at the Department of Scientific and Industrial Research, Auckland, New Zealand, on the inheritance of immunity from pea mosaic virus [26, p. 231], F_1, F_2, and F_3 and back-cross data from crosses between the susceptible varieties Blue Prussian and Greenfeast (syn. Lincoln) and the immune varieties William Massey (syn. Kelvedon Wonder) and Onward indicated that immunity is controlled by a single recessive gene, which is designated *mo*. The evidence obtained also suggested that the susceptible heterozygote can be separated from the homozygote (*mo mo*) by the time of symptom appearance after inoculation and by the type of symptom, three categories of which are distinguished: (*a*) early mottling, followed by systemic necrosis and death of the plants; (*b*) mottling and stunting, usually with reduced seed production; and (3) mottling only. The type of symptom that developed appeared to depend, however, on the variety or the parentage (in crosses) and on the strain or isolate of the virus, and the complex virus-host relationship encountered has yet to be elucidated.

Pozdéna (J.), Suobodová (J.), Petru (E.), Limberk (J.), & Blattný (C.). **Ein Beitrag zur Kenntnis des Erbsenmosaiks in der ČSR.** [A contribution to the knowledge of Pea mosaic in the Czechoslovakian Republic.]—*Fol. biol.*, 1, pp. 298–309, 1955. [Abs. in *Z. PflKrankh.*, 63, 10, pp. 589–590, 1956.]

Appreciable reductions in the Czechoslovakian pea crop are reported to be caused by a virus closely related to *Pisum* virus 1 [pea enation mosaic virus] though seldom producing enations. It is transmissible through the seed (up to 1·25 per cent.) and by mechanical methods. The germination of seeds from severely infected plants is usually impaired. The authors propose the amalgamation of the enation mosaic virus and pea virus 2 [pea mosaic virus] into one, comprising several strains.

Benda (G. T. A.). **The effect of New Zealand Spinach juice on the infection of Cowpeas by Tobacco ringspot virus.**—*Virology*, 2, 4, pp. 438–454, 4 graphs, 1956.

In work at the Virus Laboratory, University of California, expressed sap from New Zealand spinach (*Tetragonia expansa*), when mixed with tobacco ring-spot virus inoculated by rubbing into cowpea leaves, caused a delay in the appearance of the primary virus symptoms.

The sap contained two active fractions, one an inhibitor which decreased the number of lesions but was destroyed by heat, and the other an augmenter, identified indirectly as a soluble oxalate salt, which increased the number of lesions. Their modes of action are discussed.

Yerkes (W. D.) & Crispín (A. M.). **Bean diseases of importance in Mexico in 1955.**—*Plant Dis. Reptr*, 40, 3, pp. 222–223, 1956.

The following diseases of beans [*Phaseolus vulgaris*] were of importance in Mexico in 1955: bacterial wilt (*Corynebacterium flaccumfaciens*) [cf. 35, p. 503], definitely identified for the first time; anthracnose (*Colletotrichum lindemuthianum*) [map 177], of which at least ten races occur, race beta affecting only the Canario types; and leaf spot (*Chaetoseptoria wellmanii*), widespread and previously described only from El Salvador and Guatemala [32, p. 616]. Angular leaf spot (*Isariopsis griseola*) [map 328], heavily affecting the local varieties in the Veracruz area, is a new record and is stated to be very serious in the southern countries of Central America and in Colombia [35, p. 166]. Bean mosaic virus [map 213], bean yellow mosaic virus [cf. 34, p. 123], and bean curly top virus [cf. 35, p. 60] occurred in considerable amounts in the breeding material at Cotaxtla, the last mentioned differing from that in the western United States in that the plants were not killed and sometimes produced small pods with viable seed.

Oxenham (B. L.). **Bean rust control.**—*Qd agric. J.*, 82, 6, pp. 319–320, 1 fig., 1956.

The occurrence in Queensland, symptoms, and control of rust (*Uromyces appendiculatus*) [34, p. 136] on French beans [*Phaseolus vulgaris*] are described. Besides sulphur dust [loc. cit.], which also controls leaf spot (*Isariopsis griseola*) [33, p. 209], zineb spray (2 lb. in 100 gals.) gives good control of the disease. Regular applications of copper sprays and dusts injure bean plants, while flowers and young pods are more liable to sulphur damage during warm weather. Appreciable yield reductions from rust result only when the latter becomes well established in the crop before flowering.

Yarwood (C. E.). **Simultaneous self-stimulation and self-inhibition of uredospore germination.**—*Mycologia*, 48, 1, pp. 20–24, 1 graph, 1956.

At the Department of Plant Pathology, University of California, uredospores of *Uromyces phaseoli* [*U. appendiculatus*: 33, p. 573] were shaken from bean [*Phaseolus* sp.] plants growing in the greenhouse to Petri dishes containing 10 ml. of water agar with and without added chemicals. The range of spore dosage was from 0·2 to 160 spores per cu. mm. of agar. After the seeded plates had been incubated for about 24 hours in the dark, percentage germination and germ-tube length were determined.

With increasing numbers of uredospores the percentage germination of the spores decreased, though the length of the germ-tubes increased. This dual effect was greater at 25° C. than at lower temperatures and was increased by acidifying the agar with sulphuric acid. The self-stimulation of germ-tube growth was apparent throughout most of the germination period.

Anthracnose in transported Beans.—*Agric. Gaz. N.S.W.*, 67, 7, pp. 378–379, 2 figs., 1956.

There has been a high incidence of anthracnose (*Colletotrichum lindemuthianum*) in beans [*Phaseolus vulgaris*: 35, p. 878] sent to market in Sydney, New South Wales. Control is difficult, as pods may show no spotting when picked, but may be facilitated by the use of clean containers. If possible, the pods should not be washed. High temperatures and poor ventilation should be avoided during transport.

Bhatt (V. V.), Abhyankar (S. G.), & Patel (M. K.). **A new bacterial leaf spot on Phaseolus trilobus.**—*Curr. Sci.*, 25, 9, p. 299, 1956.

At the Plant Pathological Laboratory Agricultural College, Poona, India, *Xanthomonas phaseoli-trilobi* n.sp. was found to be responsible for the bacterial leaf-spot of the trilobate kidney bean (*Phaseolus trilobus*) at the College Farm in June, 1954. Minute, water-soaked spots developed on the lower surface of the leaves and later enlarged, becoming angular and chocolate-brown in colour. The pathogen, the cultural reactions of which are described, differs from *X. phaseoli* in certain characters and is highly host-specific.

Quantz (L.). **Eine für Deutschland neue Viruskrankheit der Gartenbohne durch ein Tabaknekrose-virus.** [A disease, new to Germany, caused by Tobacco necrosis virus on garden Beans.]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, 8, 1, pp. 7–8, 3 figs., 1956.

The author briefly describes 'black legginess' (bean mosaic virus) of beans (*Phaseolus vulgaris*) [cf. 35, p. 741], and reports the finding of stipple streak [tobacco necrosis virus: cf. 28, p. 645; 35, p. 262] on beans of the variety Mombacher Speck at Frankfurt-am-Main in late summer 1955, producing brown, necrotic patches on the pods and resulting in considerable loss of marketable yield. The identity of the virus was confirmed by sap inoculation into *Phaseolus* sp., tobacco, *Gomphrena globosa*, *Chenopodium quinoa*, lupins, and field beans (*Vicia faba*). This is the first record of the disease in Germany.

Jacks (H.) & Webb (A. J.). **Field tests for control of Broad-Bean rust.**—*N.Z.J. Sci. Tech.*, Sect. A, 38, 2, pp. 157–159, 1956.

Most of the fungicides tested in the field over three seasons at the Plant Diseases Division, Auckland, New Zealand, gave good control of rust (*Uromyces fabae*) on Yates Early Longpod broad beans [34, p. 623]. Dithane Z-78 at 2 lb. per 100 gals. (zineb at 0·13 per cent.) and fuclasin ultra 2 lb. (ziram at 0·14 per cent.) were outstanding, applications at 21-day intervals reducing the average number of lesions per leaf from 67·8 (sprayed with water) to 1·6 and 5·8, respectively. Manzate 0·5 lb. (maneb at 0·035 per cent.), thirospray 2 lb. (thiram at 0·1 per cent.), and spergon wettable powder 1 lb. (chloranil at 0·048 per cent.) were equally effective when applied at intervals of seven and ten days and manzate also at 14 days.

Castano (J. J.) & Kernkamp (M. F.). **The influence of certain plant nutrients on infection of Soybeans by Rhizoctonia solani.**—*Phytopathology*, 46, 6, pp. 326–328, 1 fig., 1956.

At the Minnesota Agricultural Experiment Station, soy-beans of the Ottawa Mandarin variety were inoculated with two physiologic races of *Rhizoctonia* [*Corticium*] *solani* [33, p. 366], IB4 and CTIC, both originally isolated from soy-bean, and grown in sand culture deficient in calcium, magnesium, iron, sulphur, nitrogen, or potassium. The severity of infection was enhanced by the absence of any of these elements except potassium. The cortical tissues of plants lacking calcium were poorly organized, facilitating hyphal invasion (but in another test different

levels of calcium and magnesium did not influence infection). Nitrogen and iron deficiencies were also associated with a high incidence of infection, and chlorosis often indicates shortage of the latter element in Minnesota.

Race IB4 proved to be much more pathogenic than CTIC in these tests, the former causing 86·7, 83·7, 72·7, 68, 62·7, and 60 per cent. infection, respectively, in plants deprived of calcium, iron, nitrogen, phosphorus, sulphur, or magnesium, and the latter 36, 38·7, 16·7, 17·3, 16, and 16·7 per cent. In the control series, supplied with all the nutrients, the percentages of infection induced by IB4 and CTIC were 48 and 12, respectively.

Wiggell (D.). **Control of white rot in Onions.**—*Plant Path.*, 5, 2, pp. 60–61, 1956.

In an experiment on the control of white rot (*Sclerotium cepivorum*), conducted by the National Agricultural Advisory Service, Leeds, White Lisbon salad onion seed was treated with technically pure calomel dust at 1, $\frac{3}{4}$, and $\frac{1}{2}$ lb. per 1 lb. of seed [cf. 33, p. 134], these treatments being compared with 4 per cent. calomel dust applied in the drill at 1 lb. per 50 yards and an untreated control. The seed was sown on a site where in the previous year onions had become severely infected. One day before harvesting the mean number of healthy plants per yard of drill for the different treatments was, respectively, 79·3, 84·3, 74·5, 58·8, and 31·9, and of infected plants 2, 1·7, 4·2, 15·9, and 26·9. The wholesale value of the crops was, respectively, 291, 312, 276, 219, and 117*s.*, and the cost of the treatments 36, 27, and 18*s.* and 11*s.* 7*d.*

These results show that despite the high price of the calomel dust (58*s.* per lb.), seed treatment is well worth while, and particularly so when the soil to be used is suspected of being contaminated with the fungus.

Whitney (N. J.). **The control of violet root rot in Ontario.**—*Canad. J. agric. Sci.*, 36, 4, pp. 276–283, 2 figs., 1956.

At the Plant Pathology Laboratory, Canada Department of Agriculture, Harrow, Ontario, treatment of naturally infested muck soil in the greenhouse with 4 per cent. formaldehyde (2 l. per sq. yd.) and 20 per cent. pentachloronitrobenzene (brassicol, 50 gm.) reduced the percentage infection of carrots by violet root rot (*Rhizoctonia crocorum*) [*Helicobasidium purpureum*: 34, p. 203] from 100 (untreated) to 0 and from 94·4 to 27·3, respectively. In the field methyl bromide (dowfume MC-2, 39 and 78 ml.), 4 and 10 per cent. formaldehyde (1 l.), bleaching powder (2 oz.), and 50 per cent. thiram (18 gm.) in descending order of efficiency, all significantly reduced the disease in Chantenay carrots sown two weeks after treatment; one application of each of the first three materials remained effective for two years. Since methyl bromide depressed the stand considerably, the 4 per cent. formaldehyde solution at 2 l. per sq. yd. is recommended for use against the disease.

Of the ten carrot varieties grown in naturally infested soil, Chantenay and Chantenay Red Cored appeared to be the most tolerant. Early harvesting before the pathogen can become established is advisable.

Cox (R. S.). **Progress in the control of bacterial spot of Pepper in South Florida.**—*Plant Dis. Reptr*, 40, 3, pp. 205–209, 1956.

Further investigations at the Everglades Experiment Station, University of Florida, Belle Glade, confirmed previous findings on the effectiveness of streptomycin (in agrimycin 100) against bacterial spot (*Xanthomonas vesicatoria*) of [chilli] pepper, its additive effect when combined with copper A and tribasic copper sulphate [35, p. 506], and its compatibility with a number of other fungicides. A programme for the prevention of the disease rather than for its eradication is indicated because under south Florida conditions applications are required at least

weekly. The effectiveness of agrimycin 100 increased with increased concentrations from 100 to 600 p.p.m.

Semal (J.). **Note sur la présence chez le Céléri (Apium graveolens) de Cucumis virus 1 var. Chr. Noordam.** [A note on the presence in Celery (*Apium graveolens*) of *Cucumis* virus 1 var. *Chr.* Noordam.]—*Parasitica*, 12, 2, pp. 29–31, 1 pl., 1956.

In September, 1955, from two Roi des Jaunes celery plants growing in a plot at the Agricultural Research Institute, Gembloux, Belgium, and showing on the leaves dark yellow, interveinal spots arranged in circles or in broken lines, together with vein-clearing, a virus was isolated which, when inoculated to tobacco and thence to *Nicotiana glutinosa* gave rise to symptoms identical with those produced on the same hosts by the chrysanthemum strain of cucumber mosaic virus from chrysanthemum [32, p. 559]. A serum agglutination test and cross-inoculation using Plein Blanc Doré celery plants indicated that the virus isolated from the two originally affected plants was the chrysanthemum strain of cucumber mosaic virus, not before recorded on celery.

Jacks (H.) & Webb (A. J.). **A note on field control of Celery leaf-spot (Septoria apii Chester).**—*N.Z.J. Sci. Tech.*, Sect. A, 38, 2, pp. 129–131, 1956.

In a field test at the Plant Diseases Division, Auckland, New Zealand, applications of cop-ox at 0·5 per cent. (copper oxychloride at 0·25 per cent.), fermspray at 0·4 (ferbam at 0·28), tank formulated zineb at 0·038 per cent. nabam plus 0·1 per cent. zinc sulphate (dithane D-14 at 0·2), each at intervals of seven or 14 days, and phygon XL at 0·05 (dichlone at 0·025 per cent.), and thirospray at 0·4 (thiram at 0·2), both at 7 days, were equally effective in preventing heavy outbreaks of celery leaf spot (*Septoria apii*) [35, p. 505]. The lower effectiveness of cop-ox and the higher rain resistance of fermspray, phygon XL, and dithane D-14 screening tests [loc. cit.] were not confirmed in the field.

Appert (J.). **Les insecticides systémiques dans la lutte contre la rosette de l'Arachide.** [Systemic insecticides in the control of rosette of Groundnut.]—*Bull. agron. Fr. d'out. mer* 12, pp. 105–108, 1955. [English summary. Received October, 1956.]

At the Centre for Agricultural Research, Bambey, Senegal, experiments with various insecticides showed no significant difference in their efficiency for the control of groundnut rosette virus [see next abstract]. No treatment was found to give full protection to the plant and the author concludes that in this case, besides being expensive and dangerous, insecticides are of limited value.

Tourte (R.) & Fauché (J.). **La 'rosette' de l'Arachide.** ['Rosette' of Groundnut.] —*Bull. agron. Fr. d'out. mer* 13 (*1954*), pp. 155–161, 3 graphs, 1956.

Studies at the Centre for Agricultural Research, Bambey, Senegal, in 1954, using the early 28–204 and the late 28–206 varieties, revealed that the incidence of groundnut rosette virus [34, p. 570 and next abstract] varies in inverse proportion to seed rate. Sowing at the rate of 333,000 seeds per ha. (60 by 5 cm. spacing, resulting in 186,000 and 137,025 plants per ha. for the two varieties at harvest) gave a mean 7·9 per cent. incidence, while the more normal rate of 41,500 seeds per ha. (60 by 40 cm., resulting in 34,259 and 27,662 plants) gave 65·7 per cent.

The effect of manurial treatment on the intensity of the disease varied somewhat in accordance with the seed rate, but fertilizer applied at 150 kg. per ha. diminished the incidence when the seed rate was high. There was a positive correlation between the intensity of the disease and the number of empty pods harvested. Direct control by destruction of the vector [but see preceding abstract] or by use of resistant varieties is recommended.

Catherinet (M.), Sauger (L.), & Durand (Y.). **Contribution à l'étude de la rosette chlorotique de l'Arachide.** [Contribution to the study of chlorotic rosette virus of Groundnut.]—*Bull. agron. Fr. d'out. mer* 13 (*1954*), pp. 163–180, 8 graphs, 1956.

Further tests at the Centre for Agricultural Research, Bambey, Senegal, in 1954 confirmed the resistance to rosette virus of the 11 groundnut lines studied in 1952 [33, p. 464 and see preceding abstract]. Experiments with four susceptible varieties, 28–204, Plovdiv Red, 28–206, and 24–211, indicated that there was no genetic correlation between the susceptibility of certain lines and their physiologic or morphological characteristics. The effect of rosette on the yield of various lines at different sowing dates is demonstrated by graphs. It is concluded that since the yield of the resistant varieties has so far been poor the rosette problem still remains unsolved.

Doughty (L. R.), Jennings (D. L.), & Gourlay (D. W.). **Cassava breeding.**—*Rep. E. Afr. Agric. Res. Org., 1955*, pp. 36–39, [? 1956].

In this report [35, p. 589] it is stated that many of the resistant cassava clones which showed a high incidence of mosaic in 1953 [34, p. 83] recovered, some completely and some partially, in their second season of growth, and yielded well when harvested after 20 months. The clones 4723A/26, 46106/27, and 4763/16 were highly resistant to mosaic and brown streak viruses and yielded 25, 27, and 35 tons per acre, respectively. Incidence of these viruses in the 1953–4 trials at the Sisal Experiment Station, Ngomeni, Tanganyika, was relatively low. In a retrial of 35 selected resistant clones, harvested after 15 months in February, 1955, 46106/27 gave the best yield (26 tons per acre) and remained free from brown streak.

Observations had suggested that in vigorously growing plants the mosaic virus travels to the base of the plant without causing symptoms. Less favourable conditions may arrest this movement so that symptoms appear, and it was thought that a check in growth, as by removal of the terminal buds, might have the same result. In a trial with 440 clones not selected for resistance 49 per cent. of the plants so treated showed mosaic symptoms in their new growth, as opposed to 29 per cent. of the untreated; the corresponding figures for resistant varieties were 33 and 11 per cent.

No variety immune from mosaic has yet been produced. Movement of the virus in the plant [cf. 18, p. 231] is principally downwards. In the most susceptible varieties the virus apparently remains active in or near the growing point. Cuttings of symptomless shoots of resistant clones, especially when from the base of an inoculated shoot, may develop symptoms. It is still not clear whether apparent recovery in the second season of growth is due to inactivation of the virus in the root or to restriction of its upward movement.

Material quarantined at Eldoret, Kenya, and despatched thence can be guaranteed as free from brown streak virus.

Stoller (B. B.), West (R. E.), & Bailey (J. F.). **Controlling the mildew disease of the cultivated Mushroom.**—*Plant Dis. Reptr*, 40, 3, pp. 193–199, 1 fig., 1956.

At the Research Laboratory, West Foods of California, Soquel, a rapid laboratory procedure was evolved for the selection of fungicides inhibiting the growth of *Dactylium dendroides* [*Hypomyces rosellus*] on mushrooms [29, pp. 292, 601]. Tissue and spores taken directly from the mushroom beds were used to inoculate the mushrooms supported on a wire screen in a plastic cup containing water and covered with polyethylene film. After a few days the water was poured off and the mushrooms were sprayed thoroughly, then reincubated.

Of the 32 fungicides tested, terraclor and dowicide A were the best, both inhibiting the mildew at 50 p.p.m. In mushroom houses terraclor was the more effective. Experiments with a peat soil containing 50 per cent. organic matter indicated that the following practices can be recommended: spraying the bed boards with 75 per cent. wettable powder (1 lb. per 100 gals. water) before the beds are filled with compost; spraying the beds with the 500 to 1,000 p.p.m. or dusting with 20 per cent. terraclor ($\frac{1}{2}$ to 1 lb. per 1,000 sq. ft.) after the first break is picked off; or spraying the beds with 100 p.p.m. immediately after casing. Mixing as little as 50 p.p.m. of terraclor with the casing soil reduced yields.

Randall (T. E.) & Menzies (J. D.). **The perithecial state of the cucurbit powdery mildew.**—*Plant Dis. Reptr*, 40, 3, p. 255, 1956.

Perithecia of *Erysiphe cichoracearum* were found on cucumber [35, p. 330] at the Irrigation Experiment Station, Prosser, Washington, in 1954. This is the first record of powdery mildew in the perfect state on Cucurbitaceae in the United States.

Freitag (J. H.). **Western Aster yellows virus infection of Squash, Pumpkin, and Cucumber.**—*Phytopathology*, 46, 6, pp. 323–326, 1 fig., 1956.

Symptoms of aster yellows virus infection on squash, vegetable marrow, and cucumber plants observed from 1953 to 1955 in the Sacramento Valley, California, were vein-clearing, chlorosis, and stunting. Numerous secondary shoots and green, malformed flowers also developed on the two first-named hosts. Following inoculation by the feeding of aster leafhoppers (*Macrosteles fascifrons*) reared on *Plantago major* infected by the virus, the following species contracted the disease: Yellow Crookneck and Early White Bush Scallop squash (*Cucurbita pepo*), Warted Hubbard squash (*C. maxima*), Kentucky Field and Green Striped Cushaw pumpkins (*C. moschata* and *C. mixta*, respectively), and National Pickling and Early White Spine cucumbers, which died within five to ten days after the first symptoms appeared.

The virus was transmitted by *M. fascifrons* from naturally infected squash and vegetable marrow plants to *P. major* and by *Colladonus montanus* from squash to celery. It was also transmitted by grafting from naturally infected to healthy squash plants. *C. montanus* leafhoppers collected in a field proved to be natural carriers of aster yellows virus in an infective form.

Although the recent high incidence of the disease on cucurbits is difficult to explain, the virus appears to be identical with western aster yellows virus as long known in California [a strain of aster yellows virus: 25, p. 242].

Revilla (V. A.). **Control del 'Oidium' del Melon, Zapallo, y Pepino.** [Control of powdery mildew on Melon, Pumpkin, and Cucumber.]—*Bol. Estac. exp. agríc. La Molina* 60, 15 pp., 5 figs., 4 graphs, 1955. [English summary. Mimeographed.]

Control of powdery mildew (*Erysiphe cichoracearum*) in Peru has previously been by sulphur sprays, but tests carried out during 1954 at the La Molina Agricultural Experiment Station showed that spraying, or preferably dusting, with karathane [cf. 35, p. 381] is highly effective against *E. cichoracearum* on melon, pumpkin, and cucumber, both as protectant and eradicant. Karathane also avoided the leaf burning which is sometimes caused, especially on melon, by applications of lime-sulphur.

Sprays at a concentration of 0·12 per cent. with triton B-1956 and dusts at 1 per cent., each applied on three occasions at intervals of 10 days, were of roughly equal cost per ha., but dusts were more practical and avoided the damage which spraying machines were liable to cause to the growing points.

Kristensen (H. R.). **Virussygdomme hos Agurker i Danmark.** [Virus diseases of Cucumbers in Denmark.]—*Horticultura*, 10, 11, pp. 161–172, 7 figs., 1956. [English summary.]

Cucumber mosaic virus has been known in Denmark [4, p. 323; 24, p. 402] since 1918. Although it is seldom severe on its original host, the virus has been known to cause acute injury to a number of other plants, including *Daphne mezereum*, pansy, celery, and *Peperomia* sp. Isolates from *Ajuga*, *Anemone*, gladiolus, pansy, *Primula*, and *Trollius* were inactivated by 10 minutes' exposure to a temperature of 60° C. The last-named host yielded the most virulent isolate, which induced local symptoms on cucumber three to four days after inoculation and systemic ones after five to six. Of the nine varieties tested, only Torpedo showed a measure of resistance.

Cucumber green-mottle mosaic virus was detected for the first time in the country during the current year, causing widespread and severe infection (mostly 100 per cent.) in nurseries. Inoculation experiments on tobacco, *Nicotiana glutinosa*, *Datura stramonium*, cowpea, and *Chenopodium amaranticolor* gave negative results. Butchers cucumber plants generally developed systemic symptoms 10 to 11 days after inoculation. The virus retained its infectivity in dried leaf tissues and withstood 10 minutes' exposure to heating at 90°. It reacted strongly with antiserum prepared against tobacco mosaic virus [cf. 35, p. 583].

Boubals (D.), Vergnes (A.), & Bobo (H.). **Essais de fongicides organiques et organo-cupriques dans la lutte contre le mildiou de la Vigne effectués en 1955.** [Tests with organic and organo-copper fungicides in the control of Vine mildew carried out in 1955.]—*Progr. agric. vitic.*, 145, 3–4, pp. 29–37; 5, pp. 63–67, 1956.

In further spraying tests against vine downy mildew (*Plasmopara viticola*), carried out during 1955 at the École Nationale d'Agriculture, Montpellier, France, in which various organic and organo-copper materials were compared with Bordeaux mixture [34, p. 701], no treatment gave significantly better control of the disease than 2 per cent. Bordeaux mixture. A mixture of 37·5 per cent. micronized tetracupric oxychloride and 15 per cent. zineb used at 1·2 and 0·8 per cent. (but not at 0·4 per cent.) was equally effective.

The organic compounds, including mésulfan and captan, were again found to possess inadequate persistence. Vines treated with such compounds up to the end of June (when there is no longer any danger of fruit infection) should be given two final applications (in July and August) of 2 per cent. Bordeaux mixture.

Harmon (F. N.). **White Emperor virus in Cardinal and Red Malaga Grapes.**—*Proc. Amer. Soc. hort. Sci.*, 67, pp. 302–303, 1956.

At Fresno, California, one of a few vines of the newly introduced Cardinal variety bearing under-coloured fruit was budded in 1946 on to rootstocks of Solonis × Othello No. 1613. Four bore under-coloured fruit. Further transmission experiments confirmed that these vines were infected with the white Emperor virus [34, p. 343]. The virus was also able to infect Red Malaga and possibly Ribier. Pale-coloured fruit and red-brown leaves appeared within a year on inoculated vines.

Gallay (R.). **La dégénérescence infectieuse de la Vigne.** [Infectious degeneration of the Vine.]—*Rev. rom. Agric.*, 12, 7, pp. 55–57, 1 fig., 1956.

At a meeting of experts on infectious degeneration [court-noué] of the vine, convened in June, 1956, at Conegliano, Italy, by the Office international du Vin [cf. 27, p. 62] the term 'infectious degeneration' was retained and the following terminology of symptoms accepted as standard [cf. 35, p. 745].

'Variegation' (panachure) may be diffuse, when it is in scattered patches, or sectorial, or localized in the vein network, or general. 'Mosaic' is used to describe the condition where there are discoloured spots, best seen against the light, and often associated with deformation of the leaf. 'Infectious morphogenic disturbances' include the alternation of long and short internodes, the zigzag succession of very short internodes, fasciation, bushiness, leaf anomalies, and endovascular cordons. 'Leaf roll' was considered by a few experts as a doubtful character of the disease.

The meeting expressed itself in favour of legal enforcement of sanitary measures.

Vuittenez (A.). **Variation des symptomes de la dégénérescence infectieuse de la Vigne. Interprétation d'expériences de transmission de la maladie par greffage.** [Variation of the symptoms of infectious degeneration of the Vine. Interpretation of experiments on transmission of the disease by grafting.]—*C. R. Acad. Sci., Paris*, 243, 5, pp. 515–517, 1956.

Several conclusions can now be drawn from the results of experiments on the transmission of court-noué of the vine by double grafting initiated in 1952 [in Alsace, France: 31, p. 590]. Once infection has become visible externally, the same types of symptoms recur year after year on the same plant, i.e., there is never any progressive transition from mosaic to variegation or stunting.

The disease assumes diverse forms in different varieties. For instance, Seibel 10, 790, Seyve-Villard 5,247, and *Vitis mexicana* have never shown signs of variegation, while others are consistently free from mosaic, e.g., *V. davidi*, *V. ishikari*, *V. coignetiae*, and *V. amurensis*. In most species, however, including *V. vinifera*, *V. riparia*, *V. ruprestris*, *V. berlandieri*, and *V. labrusca*, the symptoms vary with the provenance of the scions used for inoculum. Different species likewise react divergently to the depressive effect of the virosis, *V. ruprestris*, *V. vulpina*, and *V. piazezkii*, for example, producing only stunted and bushy stocks, whereas the vigour of *V. coignetiae*, *V. ishikari*, and *V. amurensis*, inoculated with the same material, is not appreciably impaired.

In cross-inoculation experiments a strain of the virus which induced stunting conferred no protection against subsequent infection by one causing variegation. This absence of premunity lends further support to the hypothesis that court-noué is a complex disease composed of several types of independently transmissible viruses.

Langbein (H.). **Two new fungicides tested in viticulture.**—*Weinberg u. Keller*, 3, pp. 209–219, 1956. [German. Abs. in *Chem. Abstr.*, 50, 16, col. 11593, 1956.]

Two thiuram derivatives, dipyrrolidyl-thiuram disulphide (DPTD) and polyethylenethiuram disulphide (PETD), were tested [? in Germany] for the control of vine diseases in comparison with other organic and copper fungicides. Both the new compounds were effective against *Peronospora* [*Plasmopara viticola*] but failed to control *Oidium* [*Uncinula necator*]. DPTD was more toxic than copper to [rot] brenner [*Pseudopeziza tracheiphila*: 34, p. 77]. The two chemicals are non-phytotoxic and particularly suitable for the treatment of young vines.

Belviglieri (R. L.). **Copperless fungicidal compounds in the Verona district.**—*Riv. Vitic.*, [N.S.], 11, pp. 77–90, 1956. [Italian. Abs. in *Chem. Abstr.*, 50, 18, col. 13353, 1956.]

In comparative outdoor experiments with Bordeaux mixture and aspor [zineb] sprays for *Peronospora* [*Plasmopara viticola*] control [on vines] near Verona, Italy [34, p. 767], the latter increased vegetative vigour, expedited flowering, and augmented fruit set, but did not produce quantitative or qualitative differences in the crop. Its period of efficacy was shorter than that of Bordeaux and it was not compatible with sulphur in anti-*Oidium* [*Uncinula necator*] treatments.

Bergman (E. L.) & Kenworthy (A. L.). **Molybdenum deficiency and nitrate toxicity on Concord Grapes.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 38, 4, pp. 524–527, 3 figs., 1956.

In 1955, at the Agricultural Experiment Station, East Lansing, Michigan, cuttings of Concord grapes (*Vitis labrusca*) grown in unpurified nutrient solutions showed chlorosis of the terminal leaves and subsequently necrosis of the lower leaves due to nitrogen toxicity. Iron did not correct the condition, which was absent, however, from treatments lacking calcium, or containing ammonium or urea. This suggested molybdenum deficiency, and the addition of 0·01 p.p.m. molybdic acid to the nutrient solution rectified the condition.

Barnes (M. M.) & Jones (W. W.). **Boron deficiency of Grapes.**—*Calif. Agric.*, 10, 8, p. 12, 1 fig., 1956.

In San Bernardino County, California, abnormalities in the early growth of vines after midwinter pruning gave rise to a bushy habit attributable to boron deficiency [cf. 33, p. 589]. Leaf symptoms differed with the varieties. Basal leaves were usually distorted; in Muscat of Alexandria they were normal in colour but had irregular margins; in White Malaga they were irregular and crinkled; when severe on Matano they were somewhat fan-shaped with the margins more sharply and less regularly serrate than normal, veins were prominent, and there was chlorosis with occasional flecks of necrosis between the veins. These symptoms were restricted to the early growth of vines pruned in midwinter, those pruned in March coming into leaf later and developing normally. One application of borax at 1 oz. per vine in January, 1952, and another in November, 1955, effected a complete cure.

Gol'din (M. I.). Новый метод разделения вирусов растений. [A new method of cutting out plant viruses.]—Докл. Акад. Наук СССР [*C. R. Acad. Sci. U.R.S.S.*], 108, 1, pp. 151–152, 1956.

Experiments at the Institute of Microbiology, U.S.S.R. Academy of Sciences, showed that a piece of a necrotic vein 0·5 cm. long cut out of a leaf contains enough virus particles to cause infection of a susceptible plant. Attempts were therefore made to separate mixtures of viruses, using this technique. The sap under test was inoculated into the upper surface of the leaf, preferably into a vein. When infection was established, about 1 to 0·5 cm. of the necrotic part of the vein on the lower surface was excised. It is presumed that only particles of the virus taking part in the formation of the necrotic spot and multiplying in it can penetrate the vein. It is easy to isolate a piece of vein without taking any other tissues, whereas this is not so with the epidermis. Thus, the 'lower vein method' gives at the outset material free from foreign particles, which, whatever their number, remain in the epidermis.

By this method viruses of the tobacco mosaic group were separated in leaves of *N*[*icotiana*] *glutinosa* and those of potato virus X in *Gomphrena globosa*.

Harrison (B. D.). **Studies on the effect of temperature on virus multiplication in inoculated leaves.**—*Ann. appl. Biol.*, 44, 2, pp. 215–226, 1 graph, 1956.

Some of the information in this study at Rothamsted Experimental Station on the rate at which the Rothamsted tobacco necrosis virus accumulated in inoculated French bean [*Phaseolus vulgaris*] leaves in relation to temperature has already been noticed [35, p. 584].

It is unnecessary to assume that only those virus particles that are produced in a cell will be heat-inactivated there, particles introduced during inoculation being equally likely, apparently, to become affected. The number of lesions produced by a given inoculum of the virus depended on the temperature at which the inoculated

leaves were kept. The decrease in number of lesions that accompanied rising temperature is explained by assuming that higher temperatures increase the likelihood that particles may become inactivated before they have started the chain of events leading to the synthesis of new particles. Increasing the virus content of the inoculum to give more than one lesion per sq. cm. seldom increased the virus content of leaves kept at 10° to 30° C. Hence, the factor limiting virus accumulation was not the number of sites of infection, but was probably certain moderately mobile substances already present in the leaf, such as amino-acids, constituents of virus nucleic acid, and energy sources.

At temperatures of 30° or less tomato aucuba mosaic virus produced necrotic lesions in leaves of tobacco and *Nicotiana glutinosa*, though at temperatures above 30° the lesions were chlorotic. This change of symptom may possibly also be due to the same factor as that which limits virus accumulation. In both tobacco and *N. glutinosa* tomato aucuba mosaic virus multiplied more rapidly when the infected cells were killed.

It seems probable that the virus content of an infected cell is more closely associated with necrosis than is the average content of all cells in a leaf, as assayed by infectivity tests on sap extracted from the leaves.

Bawden (F. C.). **Virus diseases of plants.**—*J.R. Soc. Arts*, 103, pp. 436–451, 1955.

This paper, in which the author deals with recent advances in control of virus diseases with special reference to therapy and prophylaxis, constituted the Fernhurst lecture delivered on 23rd February, 1955, to the Royal Society of Arts. Examples are cited of the freeing of plants from viruses by heat therapy [2, p. 468; 14, p. 374; 29, p. 168]. Temperature is the most important variable affecting virus symptom expression. Keeping plants at 36° C. after inoculation has increased susceptibility to infection by all the viruses yet tested, but such exposure may reduce the number of lesions produced. It is suggested that this behaviour is correlated with a small temperature coefficient of thermal inactivation (Q_{10}). Viruses heated *in vitro* fall into two classes; those with elongated particles contain about 6 per cent. ribose nucleic acid, have a large Q_{10} and are inactivated only when heated near their thermal inactivation points. Spherical viruses contain three or more times as much nucleic acid, have a small Q_{10}, and lose infectivity at temperatures much below their thermal inactivation points. Only the former have been found to cause lesions in plants at 36°.

It can be shown that varying temperature affects the rate of accumulation of viruses in newly inoculated leaves [see preceding abstract]. The infectivity of leaf extracts of plants infected by tomato bushy stunt at 20° soon falls when the plants are kept at 36°, but at first there is no comparable fall of serologically related protein, suggesting that infectivity is lost initially without disruption of the virus particles. Later the specific antigen also decreases, and in three weeks no virus may be detectable. On return to 20° systemic symptoms often develop again, though some cuttings from treated plants remain virus free. Exposure to 36° decreases the virus content of plants infected by potato virus X or tobacco mosaic virus, but does not free them entirely. With less stable viruses, however, new shoots produced at 36° might be healthy, since viruses that can survive high temperatures seem not to move freely into new tissues.

The effect of high temperatures on viruses indicates that the metabolism of plants can be altered without injury to them in such a way that they no longer support the multiplication of viruses. This suggests that other means of altering the metabolism might achieve comparable results. Ultra-violet radiation provides the best evidence for such a stimulus [33, p. 584]; leaves exposed to it and then returned to normal light temporarily resist infection by mechanically transmitted viruses, and virus introduced during the period when visible light counteracts the effects of

ultra-violet is inactivated, reinoculation being necessary to obtain infection. Deep-seated virus infection is not affected by ultra-violet light.

Many substances are known that inhibit virus infection; it is probable that some combine with the virus, blocking a group on the particles that needs to be free to cause infection. Such inactivation is not permanent and the inhibitor can be removed from a mixture, leaving the virus unaffected. Inhibitors from leaves of plants have little effect in protecting their own species from infection. Some inhibitors damage the leaves to which they are applied; others do not. When sprayed on leaves, inhibitors with large molecules produce effects which may last for several days; to reduce infection, however, they would have to enter the leaf through wounds with the virus or immediately after it and they cannot prevent aphid infection. Their value under commercial conditions appears limited but they warrant further testing. Inhibitors with small molecules, such as thiouracil [33, p. 585], show less promise.

The value of insecticides in controlling virus diseases is not as yet fully known, but they can sometimes decrease spread [35, p. 869] and are useful where only a few plants in a crop are initially infected from distant sources. Their effect also depends on the rapidity with which the vector can acquire and transmit the virus.

Wiltshire (G. H.). **The effect of darkening on the susceptibility of plants to infection with viruses. I. Relation to changes in some organic acids in the French Bean. II. Relation to changes in ascorbic acid content of French Bean and Tobacco.**—*Ann. appl. Biol.*, 44, 2, pp. 233–248; 249–255, 3 graphs, 1956.

Investigations conducted at Rothamsted Experimental Station showed that susceptibility of Prince French bean (*Phaseolus vulgaris*) plants to infection by the Rothamsted strain of tobacco necrosis virus [28, p. 207; 31, p. 317, 35, p. 867], measured by local lesion counts, was increased by a rise in temperature [see above, p. 167] and usually by darkening the plant before inoculation. Plants in full light became more susceptible when carbon dioxide was removed from the air, though plants kept in darkness did not, suggesting that resistance may be related to photosynthetic carbon fixation. Increase of susceptibility by extending the dark period beyond that of normal night indicates resistance due to the presence of a labile product of photosynthesis to be unlikely, as such substances soon disappear in darkness. Attention was therefore focused on the more persistent organic acids produced by carbon fixation.

Darkening the leaves decreased the content of malic, fumaric, succinic, and glycolic acids and increased citric acid, the oxalic and malonic acid contents remaining constant, both in winter and summer, whether the darkening increased susceptibility or not. Infiltration of malic, citric, fumaric, and succinic acids individually into the leaf failed to produce any consistent change in susceptibility, though citric acid generally decreased susceptibility, except on one occasion in the dark when it increased it. If the response to darkening is attributed to the change in citrate content, it must be concluded that the concentration of citrate present in the illuminated leaf is in the virus-inhibitory range, and that loss of resistance is due to synthesis of extra citrate, which raises the concentration above the inhibitory range.

In the second paper experiments are described which demonstrated that the ascorbic acid content of leaves of French bean and tobacco plants depends on their age and on illumination immediately preceding harvest. With French bean there was a measurable diurnal fluctuation. Ascorbic acid was lost from bean and tobacco plants after three days' darkness, and from detached leaves cultured in water in darkness, and from the darkened part of partly darkened leaves. The susceptibility of French bean and tobacco leaves to tomato aucuba mosaic virus [loc. cit.] was increased by infiltrated ascorbic acid. The results indicate that ascorbic acid is

unlikely to be responsible for the resistance of tobacco leaves to tomato aucuba mosaic virus or French bean to tobacco necrosis virus.

HOLMES (F. O.). **A simultaneous-infection test for viral interrelationships as applied to aspermy and other viruses.**—*Virology*, 2, 5, pp. 611–617, 1 pl., 1956.

In an experiment at the Rockefeller Institute for Medical Research, New York, the average heights of Turkish tobacco plants three weeks after inoculation in groups of four with tomato aspermy virus [29, p. 180; 34, p. 576], the ringspot strain of potato mottle virus [potato virus X], separately and together, were, respectively, 4·3, 7·5, and 2·8 cm., uninoculated plants averaging 11·5 cm. In a similar test with tomato aspermy virus and tobacco mosaic virus the corresponding figures (six weeks after inoculation) were 8·5, 5·5, and 4 cm., as against 22·2 cm. The average heights of *Nicotiana glutinosa* plants ten weeks after inoculation with tomato aspermy virus, the severe etch strain of tobacco etch virus [34, p. 18], and both were, respectively, 8·9, 23·3, and 7·1 cm. (uninoculated 40·4 cm.). In Bonny Best tomato plants inoculations with both tomato aspermy and cucumber mosaic viruses induced a degree of stunting in excess of that caused by either alone, the difference becoming apparent 11 days after inoculation.

Thus, tomato aspermy virus behaves like an independent entity in the presence of the other viruses and is most likely not related to them. It appears feasible to follow the general rule that where there are additive effects from mixed inoculations the agents employed are not closely related.

SUHOV (K. S.) & KAPITSA (O. S.). Направленная изменчивость Х-вируса Картофеля при смешанной инфекции с вирусом Табачной мозаики. [Induced mutability of Potato X-virus during mixed infection with Tobacco mosaic virus.]—Изв. Акад. Наук СССР [*U.S.S.R. Acad. Sci. News*], *1956*, 3, pp. 53–64, 14 figs., 1956.

At the Institute of Genetics, U.S.S.R. Academy of Sciences, studies were carried out to determine whether mutability of viruses might occur where the components of a mixed infection are entirely unrelated viruses. One virus used was the X_2 strain of potato virus X, isolated from potato plants, selected by passage through *Gomphrena globosa*, and maintained in young tobacco plants. The test plants were *Nicotiana glutinosa*, *Datura*, and tomato, in which it caused a general infection of a pattern which in repeated experiments always remained the same. The other component was *Cyphomandra* strain of tobacco mosaic virus from *N. glutinosa*, characterized by the fact that it readily infected *C. betacea*, which is immune from the remaining, well-known strains of tobacco mosaic virus and here served as the infection source. Young tobacco leaves infected with the mixture developed a mosaic of chlorotic spots considerably more severe than when the *Cyphomandra* strain was used alone. Within a single cell inclusions belonging to both strains, amorphous bodies of the X_2 strain and hexagonal crystals of the *Cyphomandra* strain, could be recognized. In the early stages the latter retained their typical configuration, whereas the former were greatly enlarged and multiplied. Corresponding changes in the *Cyphomandra* inclusions, taking on the form of supercrystallization, were noticed at a later stage.

As a result of this mixed infection a new strain of potato virus X, designated X_3, was formed and in dual inoculations with the *Cyphomandra* strain on tobacco leaves produced local necroses not encountered in the previous inoculations. The development of this necrosis on the 11th day after inoculation on tobacco leaves indicated approximately the time (8th to 12th day) when X_3 appeared in mixed infections. Symptoms produced by X_3 differ distinctly from those of X_2 in tobacco, *N. glutinosa*, *Datura*, and tomato, none of which showed primary symptoms when infected with X_2, whereas X_3 produced concentric rings on tobacco and *N. glutinosa*

and irregular necrosis on *Datura*. Secondary symptoms produced by X_3 were ring mosaic in tobacco, *N. glutinosa*, and tomato, and severe mosaic and vein necrosis in *Datura*, whereas X_2 induced individual, rare, chlorotic spots in tobacco, individual, chlorotic spots in *N. glutinosa*, and mild mosaic in *Datura*. The cause of the mutability is believed to lie possibly in the mutual metabolic effects to which the viruses are subjected within a single cell.

Hollings (M.). **Chenopodium amaranticolor as a test plant for plant viruses.**—*Plant Path.*, 5, 2, pp. 57–60, 1 pl., 1956.

During the past three years, *Chenopodium amaranticolor* has proved to be a valuable complementary plant to tobacco, *Nicotiana glutinosa*, and French bean (*Phaseolus vulgaris*) for routine inoculation tests at the Plant Pathology Laboratory, Harpenden. It has reacted with local lesions to a number of viruses which fail to infect the more commonly used test plants, and in many instances the lesions produced were distinctive, and diagnostic of the virus. Dilution curves prepared for several viruses showed the plant to be very suitable for quantitative work. In diagnostic tests it has usually displayed symptoms quickly and has proved more susceptible over a longer period than most other test plants. The high concentration of inhibitory substances in the sap is a disadvantage, but this was overcome in some instances by using a dry inoculation method [cf. 33, p. 203]. The symptoms produced on this plant by 26 different viruses and virus strains are noted.

Uschdraweit (H. A.) & Valentin (H.). **Das Tabakmauchevirus an Zierpflanzen.** [Tobacco mottle virus on ornamentals.]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, 8, 9, pp. 132–133, 2 figs., 1956.

In the course of investigations of ornamental plants, undertaken to discover the winter hosts of the more important horticultural viruses [cf. 35, p. 743] and carried out for the most part in the municipal parks and gardens of Berlin, *Nicotiana* virus 5 [? a strain of potato stem mottle; see below, p. 173] was found in 8 per cent. of 500 plants examined. The authors have now isolated this virus from nearly 100 species belonging to 18 families, but the infection was, with rare exceptions, symptomless. *Chenopodium quinoa* proved a particularly useful indicator plant.

Harrison (B. D.). **The infectivity of extracts made from leaves at intervals after inoculation with viruses.**—*J. gen. Microbiol.*, 15, 1, pp. 210–220, 1 graph, 1956.

In further studies at Rothamsted Experimental Station of the behaviour of viruses in inoculated leaves [cf. above, p. 167] the infectivity of leaf extracts of French bean (*Phaseolus vulgaris*), inoculated by rubbing with Rothamsted tobacco necrosis virus, was found to decrease for the first six hours, no increase being detected (by local lesion tests) until nine to 10·5 hours after inoculation, about twice the time necessary for the virus to multiply and spread from the epidermis to the mesophyll.

There was no evidence that the initial decrease of infectivity of the virus in tobacco or French bean leaves was associated with a change in the virus particles that start the infection. Although washing inoculated leaves removes 95 per cent. of the inoculated virus, it only slightly decreases the number of infections; addition of celite, while increasing the number of lesions, causes no greater retention of virus; neither procedure affects the rate of decrease in infectivity.

When cells of *Nicotiana glutinosa* were infected by tobacco mosaic virus spreading from inoculated epidermal cells, they died within a few hours of the increase of infectivity of leaf extracts. The virus in these secondarily infected cells infects few others; and at 20° C. infectivity is at its maximum in two days.

Mesophyll cells of French bean leaves at 22° apparently synthesize new particles of tobacco necrosis virus within five hours of infection from the epidermis and

continue so to do for another 30 hours, to a probable cell content of about 10^6 virus particles. These cells then die, but the virus continues to spread and leaf extract infectivity increases for at least five days.

The fact that particles of potato virus X partly inactivated by ultra-violet radiation remain sensitive to light only for a limited time after inoculation [35, p. 583] suggests that changes occurring more than two or three hours after inoculation do not reflect the beginning of a process which ends in virus multiplication. Since tobacco necrosis virus in leaf extracts continues to lose infectivity at least until new virus has started to accumulate in secondarily infected cells, when ultra-violet irradiation of the leaves prevents few or none of the lesions developing, it seems that most of the decrease in infectivity is separate from the processes leading to the production of new virus.

Rawlins (T. E.), Weierich (A. J.), & Schlegel (D. E.). **A histochemical study of certain plant viruses by means of the Sakaguchi reaction for arginine.**—*Virology*, 2, 3, pp. 308–311, 1956.

Tests at the Department of Plant Pathology, University of California, on the Sakaguchi colour reaction for arginine proved this to be a successful method for locating tobacco mosaic virus in plant tissues. Cell inclusions in infected tobacco leaves gave a strong reaction. Virus concentration was sometimes highest in the palisade parenchyma cells but more often in the cytoplasm of the epidermal and hair cells.

The phloem of beet leaves infected with curly top virus reacted much more strongly than the phloem of healthy leaves.

Maramorosch (K.). **Multiplication of Aster yellows virus in in vitro preparations of insect tissues.**—*Virology*, 2, 3, pp. 369–376, 1956.

At the Rockefeller Institute for Medical Research, New York, nymphs of aster leafhoppers (*Macrosteles fascifrons*) inoculated with aster yellows virus [35, p. 2, and above, p. 164] from viruliferous leafhoppers had no detectable virus the following day, but when they were cut up and the tissues incubated for ten days in a suitable medium the virus was recovered by injections into uninfected leafhoppers. It is not yet known in which specific tissue the virus multiplies.

Köhler (E.) & Köhler (D.). **Über die Beziehung zwischen Viruskonzentration von Impflösungen und Infektionshäufigkeit.** [On the relation between the virus concentration of inoculum solutions and infection frequency.]—*Biol. Zbl.*, 75, 9–10, pp. 531–543, 1 fig., 7 graphs, 1956.

From the Biological Institute, Brunswick, Germany, the authors describe a modified local-lesion method for the quantitative determination of virus concentration. It consists in the inoculation of leaves of an appropriate test plant with a mixture of different viruses, the concentration of one being held constant while that of the other is varied. The former is used as a criterion of the number of lesions obtained. The procedure was applied in serial dilution experiments on Samsun Bashi Bagli tobacco leaves with a mixture of tobacco mosaic and potato virus X [see above, p. 170] (of which only severe strains isolated, e.g., from the Up-to-Date variety, are suitable for this purpose). The values obtained were found to give a straight-line relationship between infection frequency and virus concentration.

Kaesberg (P.). **Structure of small 'spherical' viruses.**—*Science*, 124, 3223, pp. 626–628, 4 figs., 1956.

At the Department of Biochemistry, University of Wisconsin, Madison, lightly shadowed, frozen-dried preparations [35, p. 400] of purified turnip yellow mosaic virus [see above, p. 156], squash mosaic virus [35, p. 863], wild cucumber [*Echinocystis lobata*] virus [loc. cit.], and brome grass mosaic virus [brome mosaic virus: 35,

p. 612] almost invariably suggested a polygonal contour under the electron microscope. Hexagonal contours were often seen in the three last-named viruses and occasionally in turnip yellow mosaic virus. The evidence from this material and heavy shadowing with uranium suggests that these four viruses may have approximately the shape of symmetrical icosahedrons, and it appears from the particle contours that this approximation is fulfilled best by brome mosaic virus and least by turnip yellow mosaic virus.

Schmelzer (K.). **Beiträge zur Kenntnis der Virushemmstoffe in Cuscuta-Arten.** [Contributions to the knowledge of virus-inhibitors in *Cuscuta* species.]—*Zbl. Bakt.*, Abt. 2, 109, 20–22, pp. 482–515, 5 graphs, 1956.

Further experiments at the Institute for Phytopathology, Aschersleben, Germany, revealed the existence in the expressed saps of various dodders (*Cuscuta* spp.) of substances inhibitory to the development of infection by tomato spotted wilt virus (tested on *Nicotiana glutinosa*); lucerne mosaic on Goldhorn bean (*Phaseolus vulgaris*); a virus isolated from stock (*Matthiola* sp.) with 'broken' flowers which caused pronounced mosaic and foliar distortion of swede and mustard, very mild symptoms on cauliflower, and necrotic local lesions on Samsun tobacco (the host in these tests); potato virus Y on *Physalis floridana* and X on tobacco and *Amaranthus retroflexus*; cucumber mosaic virus on cowpea; tobacco [potato] stem mottle virus [35, p. 128] on *Nicotiana glutinosa* and tobacco; and tomato bushy stunt virus on *N. glutinosa*.

The inactivating principle was strongest in *C. campestris* (in which its potency was retained after up to eight months' storage at 0° C.), *C. epithymune*, and *C. europaea*, followed by *C. gronovii*, *C. epilinum*, and *C. californica*, while little or no inhibitory effect was exerted by *C. lupuliformis* and two forms (red- and white-leaved) of *C. subinclusa*. In all the species fresh material from the inflorescences was more active in the suppression of virus development than that taken from the stems. However, naturally ripened and dried stem material, even of the less active species, caused a heavy reduction of infection. Applied to the under side of the leaf, or to the upper side 30 minutes after inoculation with the virus, the dodder saps caused practically no inhibition, but they were still very active after eight days when placed on the upper surface before inoculation.

Köhler (E.). **Versuch einer Deutung der Partikellängen pflanzlicher Virusarten.** [Attempt at an interpretation of the particle lengths of plant virus species.]—*Naturwissenschaften*, 43, 10, pp. 230–231, 1956.

The dense aggregates of abnormally long fibrils revealed by recent electron-microscopic studies of various plant viruses are interpreted as primary structures representing the growth of the infective entity *in situ*, and not as agglomerations of individual particles that have developed subsequently. It is assumed that the fibrils develop in a longitudinal direction by apposition and disintegrate into the familiar particles in the host cell [cf. next abstract].

Brandes (J.). **Ein Beitrag zur Frage der Vermehrung faden- und stäbchenförmiger Pflanzenviren.** [A contribution to the question of the multiplication of filamentous and rod-shaped plant viruses.]—*Naturwissenschaften*, 43, 18, p. 428, 1 fig., 1956.

Discussing the variability in the length of plant virus particles disclosed by electron-microscope studies, the author concludes from his work on tobacco mosaic [35, p. 639] that the process of aggregation into bundles occurs in the host cell [cf. preceding abstract]. It is thought, however, that disintegration of the very long, labile fibrils, seen in fresh cells, into particularly stable particles of 'normal' length occurs mainly in the course of isolation.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, 4, 7, p. 111; 8, pp. 125–126; 10, pp. 159–160; 11, pp. 173–175, 1956.

By Order of 3rd February, 1955, the importation into Egypt of narcissus bulbs affected by *Fusarium bulbigenum*, *Stagonospora curtisii*, or *Ramularia vallisumbrosae*, and tulip with *Rhizoctonia* [*Sclerotium*] *tuliparum* may be permitted after they have received treatment with 0·3 per cent. mercuric chloride for ten minutes. Furthermore, the entry of fruit and potatoes without treatment may be authorized despite the presence of a number of [listed] diseases.

Ministerial Decree of 5th January, 1956 (*J. off. Républ. franç.*, 88, 10, 1956), repeals the Decree of 30th September, 1952 [32, p. 539], and requires phytosanitary certification of sugar-cane planting material for importation into Guadeloupe, Guiana, and Martinique, that it originated in an area free from all [sugar-cane] virus diseases and from *Xanthomonas albilineans*. Orders dated 30th September, 1955 (*J. off. Viet-Nam*, 8, 48, 1955), modify an Order of 22nd June, 1953 [33, p. 584], concerning plant importations, and designate ports of entry in Viet-Nam for plant material.

Quarantine Proclamation No. 43 P of 13th March, 1956 (*Commonw. of Australia Gaz.* 13, 1956), prohibits the importation into Australia of lucerne, other than seeds, and these only under permit. Order of 30th March, 1956 (*J. off. Républ. franç.*, 88, 85, 1956), regulates the imports into French Overseas African Territories of products originating in tropical America, capable of transmitting and propagating *Hevea* rubber diseases, especially *Dothidella ulei*.

The Importation of Plants, Seeds, and Potatoes (Jersey) Order, 1956, lists those plants with prohibited or restricted entry into Jersey. Two forms of phytosanitary certificate are prescribed: one, as set out by the International Plant Protection Convention of 1951 [34, p. 280], for consignments of plants from outside the British Isles and the Republic of Ireland; the other, certifying conformance with the current phytosanitary regulation of the importing country, for all others. By a notice published in *Fed. Reg.*, 21, 77, 1956, *Rhododendron* spp. imported into the United States from Europe, Asia, New Zealand, and Canada are required to be grown in post-entry quarantine to prevent further introduction of *Chrysomyxa ledi* var. *rhododendri* [*C. rhododendri*: 35, p. 544 and next abstract].

United States Department of Agriculture, Agricultural Research Service, Plant Quarantine Branch. P.Q.-Q. 37, Amendment.—2 pp., 1956.

Conclusive evidence having been secured that *Chrysomyxa rhododendri* [see preceding abstract] does not occur in the Netherlands, this present amendment (effective 26th October, 1956) exempts from the list of restricted material (to be grown under post-entry quarantine on introduction into the United States) all species and varieties of *Rhododendron* imported from that country.

Plant quarantine import restrictions, Belgian Congo and Republic of Syria.—*S.R.A., Bur. Ent., Wash.*, 184, pp. 69–70, 87–90, 1956.

Under the revised (1955) plant quarantine import restrictions, every shipment of plants, tubers, or seeds imported into the Belgian Congo (including the Province of Katango) must be accompanied by a certificate of origin guaranteeing freedom from cryptogamic disease or infectious agents. Absolute prohibition of importation operates for maize (to prevent the introduction of *Puccinia polysora*). Permits from the Governor-General are necessary for the importation of wild or cultivated banana plants, propagative material of cacao, coffee plants or parts thereof, cotton seed (except for experimental stations), seeds and plants for sericulture, and propagative materials of sunflower.

Legislative Decree No. 132 strictly prohibits the entry into Syria of shipments of plants infected by over 30 disease organisms [which are listed]. The following

products are admitted only if required in the national interest: cotton plants and all parts thereof, American grape vines and parts, soil, live insects, pathogenic bacteria and fungi, and bags or other containers used for packing and wrapping any of the foregoing.

Announcements relating to White-Pine blister rust quarantine (No. 63). Two California counties included within White-Pine blister rust infected areas.—*S.R.A., Bur. Ent., Wash.*, 184, pp. 65–68, 1956.

As from 30th September, 1955, the counties of Calaveras and Tuolumne, California, have been removed from those designated as non-infected by white pine blister rust [*Cronartium ribicola*: 32, p. 464]. Another amendment to the existing regulations restores an exception permitting the movement of white pines into non-infected States, when the trees are certified as originating in a disease-protected nursery and are intended for reafforestation purposes. Furthermore, the special treatment accorded to a small portion of California designated as a blister rust control area is to be discontinued. Instead, State authority will be invoked to enforce the removal of any planted currants or gooseberries that might spread infection within the former protected region.

Importation of Carnation cuttings.—*Gdnrs' Chron. & Gdng ill.* (formerly *Gdnrs' Chron.*), 140, 15, p. 372, 1956.

The Importation of Carnation Cuttings Order, imposed by the Ministry of Agriculture, Fisheries, and Food on 30th September, 1956, prohibits the importation of carnation cuttings into England and Wales except those derived from plants tested and found to be free from bacterial wilt (*Pseudomonas caryophylli*) [35, p. 767] or other similar organisms, or coming from countries where such bacterial wilts are not known to be established in any region.

Thirty-fifth and Thirty-sixth Reports of the National Institute of Agricultural Botany, Cambridge, 1954, 1955.—50 pp., 1954; 52 pp. 1 pl. 1955. [Received 1956.]

In the mycology section (pp. 22–23) of the 1954 report [cf. 34, p. 516] it is stated that races 6 and 8 of wheat yellow rust [*Puccinia glumarum*] were widespread throughout England, races 5 and 7 were found in south-east Scotland, while the known distribution of race 2B was extended to Cheshire, Yorkshire, and for the first time as far north as Scotland. Possibly the worst infection of loose smut [*Ustilago nuda*] of barley ever recorded in England occurred in the period under review, 19 per cent. being found in one winter barley stock. The best control of wheat loose smut [*U. tritici*] was achieved in seed soaked for four hours in water at 94° F. followed by 10 min. at 127° to 129°, then plunged into cold water and dried. Barley seed treatment against *U. nuda* was similar, but was done at 124° to 126°.

The Potato Branch reports (pp. 24–29) the detection in potato leaf samples of an unidentified virus which did not react to potato virus X antiserum and induced severe symptoms on French bean (*Phaseolus vulgaris*). Tobacco veinal necrosis virus [strain of potato virus Y] was isolated from a crop of Craigs Royal potatoes near Cambridge.

Laboratory tests of eight susceptible potato varieties indicated an increase in field susceptibility to blight [*Phytophthora infestans*] as the season advanced. Later-maturing varieties possessed greater field resistance. In blight samples from 13 trial centres race D [race 4: 33, p. 251] predominated while A [0] was infrequent in 1954. *P. infestans* was not found on the resistant Pentland Ace at seven centres.

Samples of Ulster Supreme were affected by an unusual dark pit rot caused by *Rhizoctonia*.

The section of the 1955 report dealing with mycology (pp. 21–22) states that races 2B and 8 of wheat yellow rust were identified in England, though infection was low. Barley infection by loose smut was less than in the preceding year. It was again indicated that the smut in winter barley is pathogenically different from that attacking spring barley, and some of the Nordgaarden varieties and Freja appeared to be resistant to the former.

Plots of timothy grass [*Phleum pratense*] growing in the trial ground displayed symptoms of brown striping and blotching in September. Affected leaves were covered with *Helminthosporium* spores, constituting a new disease record for England. An examination of 200 timothy seed samples showed most of them to be infected, a few as much as 20 to 30 per cent. Some of the infected seeds do not germinate; those which do develop browning of the coleoptiles.

It is reported from the Potato Branch (p. 27) that the unidentified virus of the previous year was related to lucerne mosaic virus; cucumber mosaic virus was identified for the first time in this country in potato. Varietal field trials on susceptibility to potato virus diseases showed the reduction in yield due to leaf roll or severe mosaic [potato virus Y] to be less than that expected on results from single plants, under 10 per cent. infection causing no appreciable loss.

The initial growth of the *Rhizoctonia* causing pit rot of potato tubers was stimulated when a suspension of *Phytophthora* [*infestans*] was sprayed on the cut end of the tuber. Eventually the *Phytophthora* was suppressed and the *Rhizoctonia* penetrated the tuber.

Peterson (R. F.). **Progress Report, Cereal Breeding Laboratory, Winnipeg, Manitoba, 1949–54.**—36 pp., 12 figs., 1956.

In each of the six years under review there was appreciable damage to the wheat crop in Manitoba and Saskatchewan by stem rust (*Puccinia graminis*), leaf rust [*P. triticina*], or both. The greatest losses were in 1952–4; in 1952 the loss was estimated at 7,500,000 bush. in Manitoba; in 1953 for Manitoba and Saskatchewan it was at 43,000,000 [35, p. 157]. Kenya Farmer [35, p. 664] is apparently resistant to all races of stem rust present in North America, including those capable of infecting Selkirk [loc. cit.]. Resistance to race 15B of *P. graminis* [36, p. 93, and below, p. 108] in McMurachy wheat [35, p. 157] has been located in chromosome XX.

Oat varieties have now been developed that are resistant to all known races of stem rust [34, p. 432]. Race 263 of crown rust [*P. coronata*: 34, p. 90], though not yet widespread, attacks all commercial varieties and all breeding material except Victoria, Ukraine, Saia, and Glabrota; of these four, only Ukraine is suitable for breeding purposes. No change was observed in varietal reactions to smut [*Ustilago avenae* and *U. kolleri*: cf. 34, p. 432], which suggests that there has been little, if any, shift in the race population. Sixth-generation lines have been developed that are resistant to smuts and to all known races of stem and crown rusts, except race 263 of crown rust.

The situation as regards resistance to rust [*P.* spp.] in barley varieties appears to be satisfactory. The forage varieties Vantage [34, p. 592], Vantmore [34, p. 432], and Husky are all resistant to wheat stem rust. It appears that the gene for resistance is ineffective against rye stem rust (*P. graminis* [f.sp.] *secalis*) [34, p. 592]; of 271 barley varieties tested, only Black Hulless (C.I. 666) displayed good resistance. At present rye stem rust appears to offer no serious threat to barley production in Manitoba and eastern Saskatchewan. Occasionally, barley was severely affected by net blotch (*Helminthosporium* [*Pyrenophora*] *teres*) [35, pp. 157, 418], and it seems that this disease, together with spot blotch (*H. sativum*) [*Cochliobolus sativus*: loc. cit.] and *Septoria* leaf blotch (*S. passerinii*) [loc. cit.], the latter quite prevalent in some years, is causing serious losses in both yield and quality. There appear to be physiologic races of *P. teres*, as none of six barley varieties, without

lesions for three successive years in California in natural and artificial epidemics, was immune in the greenhouse at Winnipeg when tested against a Manitoba isolate of the fungus.

Work in co-operation with D. J. Green of the Plant Pathology Laboratory, Winnipeg, indicated that the Feebar and Atlas barley varieties both possess dominant genes for resistance to *S. passerinii*, that of the former being superior to that of the latter.

Aster yellows virus disease became more prevalent on flax [34, p. 629; 35, p. 451], but the most severely affected fields had under 10 per cent. infection.

R. C. McGinnis detected a haploid chromosome number of three in *Puccinia coronata* [f.sp.] *calamagrostis* [cf. 33, pp. 341, 718]; four in *P. xanthii*, *P. malvacearum*, and *P. asteris*; six in *P. carthami* and *P. sorghi*; and probably eight in *Coleosporium solidaginis*. The question of polyploidy in *Puccinia* is being investigated.

New plant diseases.—*Agric. Gaz. N.S.W.*, 66, 11, p. 604, 1955. [Received September, 1956.]

Among new diseases reported in New South Wales for the six months ended 30th June, 1955, those not already noticed [cf. 35, p. 877] are ratoon stunting virus disease, Fiji virus disease, and *Fusarium moniliforme* [*Gibberella fujikuroi*: 20, p. 558] on cow cane (*Saccharum* sp.); maize anthracnose (*Colletotrichum graminicola*) [cf. 35, p. 876]; and charcoal rot (*Macrophomina phaseoli*) on cowpea [cf. 31, p. 589].

Dadant (R.). **Rapport sur la mission effectuée à l'Île de Wallis en Décembre 1951.** [Report on the mission to Wallis Island in December, 1951.]—*Rev. agric. Nouv.-Calédonie*, N.S. 3, 7–8, pp. 9–12, 1952. [Received November, 1956.]

The following plant diseases were noted on Wallis Island in the Pacific [cf. 35, p. 423] in 1951: *Colletotrichum gloeosporioides* [*Glomerella cingulata*], *Diplodia natalensis*, and greasy spot [17, p. 729; 26, p. 393] on citrus; bunchy top virus [map 19] (which appears to have been introduced from Fiji and for the control of which breeding of resistant varieties is advocated), *Cercospora musae* [*Mycosphaerella musicola*: map 7], *Cordana musae* [map 168], and *Uromyces musae* on banana; *Mycosphaerella manihotis*, in the *Cercospora* state only, on cassava; *C. nicotianae* [map 172] on tobacco; and an apparently new disease of taro (*Alocasia macrorhiza*), characterized by a mass of necrotic spots from 2 to 15 mm. in diameter spread over the whole surface of the lower leaves.

Thomas (P. T.), Evans (H. J.), & Hughes (D. T.). **Chemically induced neoplasms in fungi.**—*Nature, Lond.*, 178, 4540, pp. 949–951, 3 figs., 1 diag., 1956.

Fungi, by reason of their similarity in physiology to animals, are useful for fundamental studies of tumorous malformations. Tests of suitable species have been undertaken by the Department of Agricultural Botany, University College of Wales, Aberystwyth [cf. 31, p. 105]. Mushrooms (*Agaricus campestris* var. *bisporus*) [*A. bisporus*] grown in 9-in. pots on a standard compost at constant temperature and humidity produced no neoplasms when pure carcinogenic hydrocarbons were applied to the sporophores, though they affected the growth of mycelium. However, a proprietary substance containing tar acids and also diesel oil vapour produced striking effects. The latter at a concentration retarding development, but not unduly toxic, induced tumours on 80 per cent. of the fructifications after three to eight days. Tumours are composed of two types of cell, both with actively dividing nuclei: (i) small, non-vacuolate, multinucleate cells with basophilic cytoplasm; (ii) larger, vacuolate, multinucleate cells with less basophily, Intermediate types are found. The cells also show abnormal nuclear activity which,

together with the basophilic increase and other disturbances, is characteristic of animal tumour cells.

Collybia velutipes [cf. 34, p. 51] has recently proved superior to the mushroom for experimental purposes as it is smaller, can be grown on malt agar, and is particularly sensitive to both liquid diesel oil and its vapour.

Manigault (P.), Comandon (Mlle A.), & Slizewicz (P.). **Préparation d'un 'principe inducteur' de la tumeur du Pelargonium.** [The preparation of an 'inducing principle' for tumours of *Pelargonium*.]—*Ann. Inst. Pasteur*, 91, 2369, pp. 114–117, 1 pl., 1956.

A method of inducing tumours in *Pelargonium zonale* (Jardin des Plantes variety) and *Datura stramonium* with a bacteria-free preparation [35, p. 514] is described in detail from the Institut Pasteur, Paris. Incisions about 1 mm. apart are made in three or four internodes at the top of the stem, and fragments bearing the wounds are ground up. The bacteria [*Agrobacterium tumefaciens*] are cultured in the wound extract; the product is centrifuged and sterilized by filtration, its sterility being confirmed by culturing. The liquid is then purified by ultracentrifugation. Inoculations are effected by introducing a few drops of the preparation underneath a flap of cortex. The sterility of the galls thus formed is confirmed by culturing. They are reproducible by grafting, are histologically identical with tumours obtained by inoculation with bacteria, and the localization of radiophosphorus in the tissues [33, p. 284] is the same in both.

Bhatt (V. V.), Patel (M. K.), & Thirumalachar (M. J.). **Two new Xanthomonas species on legumes.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 136–142, 1 pl., 1956.

Two new bacteria causing diseases of legumes [35, p. 286] have been studied at the College of Agriculture, Poona. *Xanthomonas buteae* n.sp. causes leaf spots on *Butea frondosa*, which yields a number of industrial products including gum and medicinal oil, and whose leaves are used as fodder for buffaloes and elephants, and for manure. *Xanthomonas tephrosiae* n.sp. attacks leaves of *Tephrosia purpurea*, which serves for soil conservation and as fodder for sheep and goats.

Bhatt (V. V.) & Patel (M. K.). **Two new records of phytopathogenic bacteria from Bombay State.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 160–165, 1 pl., 1956.

Xanthomonas alysicarpi n.sp. caused a severe leaf spot and blight of *Alysicarpus rugosus* at Jalgaon, Bombay, in 1953. *Xanthomonas brideliae* n.sp. was found on *Bridelia hamiltoniana* at Ambarnath in the same year. Both plants are used for fodder.

Orellana (R. G.). **Occurrence of Monilia pod rot and other Cacao diseases in eastern Panama.**—*F.A.O. Pl. Prot. Bull.*, 4, 11, pp. 168–169, 1 fig., 1956.

In April and May, 1956, *Monilia roreri* [map 13; 35, p. 882] was detected on red Forastero (Amelonado) cacao trees growing in the Ailigandi area of Comarea San Blas and the Paya area of Darien Province, eastern Panama. The disease appears to be relatively new to this region, where it may possibly have been introduced on imported pods from the Antiquia Department of Colombia.

In the Darien Province thread blight (*Pellicularia* [*Corticium*] sp.) [cf. 35, p. 883], leaf blight and pod rot caused by *Colletotrichum* sp., and cherelle wilt of physiological origin were present, and in the Paya area cacao trees of all types were affected by anthracnose (*C.* sp.), pod rot (*Phytophthora palmivora*) [loc. cit.], and physiological wilt.

Majumder (S. K.), Sharangapani (M. V.), & Pingale (S. V.). **Chemical control of spoilage caused by microbes in stored grain.**—*Bull. cent. Food technol. Res. Inst., Mysore*, 5, 3, pp. 47–50, 1 fig., 1955.

At the Central Food Technological Research Institute, Mysore, India, damage to stored wheat, sorghum, and rice by micro-organisms was checked by methyl bromide or ethylene dibromide at a concentration of 4 to 6 lb. per 1,000 cu. ft. The latter was preferable with regard to cost and ease of handling.

Samborski (D. J.) & Shaw (M.). **The physiology of host-parasite relations. II. The effect of Puccinia graminis tritici Eriks. and Henn. on the respiration of the first leaf of resistant and susceptible species of Wheat.**—*Canad. J. Bot.*, 34, 4, pp. 601–619, 2 pl., 12 graphs, 1956.

In the second contribution to this series [cf. 35, p. 915] the effects of the frequency of pustules of *Puccinia graminis* race 15B [see following abstracts] on the first leaves of the resistant wheat Khapli and the susceptible Little Club were compared. Considerable increases in dry weight occurred at infections on Little Club in ten to 15 days, but the percentage of total nitrogen remained almost unchanged. Depending on environment, oxygen consumption rose to a peak of three times that of normal tissue, subsequently falling off. In Khapli both dry weight and total nitrogen declined rapidly, resulting in the death of the leaf in about eight days, while oxygen consumption rose from 2 to 2·5 times that of healthy tissue and declined more rapidly than in Little Club. The course of respiration was closely correlated with the accumulation of radioactive glucose at infection sites [35, p. 597], and the duration and amount of the respiratory rise were greater in the more susceptible host. In similar experiments with mildew (*Erysiphe graminis*) on barley [36, p. 95] the rate of respiration increase was much less in the resistant variety than with the rust. The possible mechanisms responsible for the respiratory increase will form the subject of a further paper.

Watson (I. A.) & Stewart (D. M.). **A comparison of the rust reaction of Wheat varieties Gabo, Timstein, and Lee.**—*Agron. J.*, 48, 11, pp. 514–516, 1956.

The seedling and mature plant reactions of the wheat varieties Gabo, Timstein, and Lee, to races of stem rust (*Puccinia graminis tritici*) [36, p. 93 and next abstract] and leaf rust (*P. rubigo-vera tritici*) [*P. triticina*: 35, p. 362] were compared. In New South Wales, using races 126 Anz 1, 2, and 3, and 222 Anz 2, 3, and 4 of *P. graminis*, it was impossible to differentiate between Gabo and Timstein. The seedling reactions of both corresponded to those of Gaza (the resistant durum parent of Gabo) but not to those of *Triticum timopheevi* or two of its derivatives. In the field Lee possessed neither the Hope nor the *T. timopheevi* type of resistance to stem rust nor the *T. timopheevi* resistance to *P. triticina*.

At the Minnesota Agricultural Experiment Station, using races 15, 29, 17, 198, 11, NR-2, and 15B of *P. graminis*, it was impossible to distinguish the resistance of Lee from that of Gabo and Timstein but it was not correlated with that of *T. timopheevi*. Seedlings of Gabo, Timstein, and Lee were resistant to race 17, but Hope and *T. timopheevi* were completely susceptible. Lee possesses neither the Hope nor the *T. timopheevi* resistance to *P. graminis* and its seedling resistance to *P. triticina* is derived from Gaza.

Watson (I. A.) & Stewart (D. M.). **Sources of Wheat stem rust resistance.**—*Agron. J.*, 48, 11, pp. 526–527, 1956.

In greenhouse tests at Minnesota Agricultural Experiment Station seedlings of the wheat variety Khapstein [36, p. 14] were resistant to most isolates of the races of stem rust (*Puccinia graminis tritici*) [see preceding abstract] prevalent in

North America. Certain sub-races which were indistinguishable on Khapli could be separated by their reactions on Khapstein.

Kenya 117A (C.I. 12568) differentiated biotypes of races of the 11–32 group, 15B, the 17–29 group, and 38, while Kenya 117A (Australian accession W1347) was not susceptible to the test isolates although its resistance was not equal to that of Kenya Farmer.

Green (G. J.) & Johnson (T.). **Specificity in the effect of high temperature on the adult plant reaction of Wheat varieties to races of stem rust.**—*Canad. J. Bot.*, 33, 2, pp. 197–201, 1 fig., 1955.

At the Plant Pathology Laboratory, Winnipeg, Manitoba, the wheat varieties K 338 AC 2.E.2 [35, p. 664] and Kenya 117A [see preceding abstract] were resistant to races 11, 12, 15A, 15B–1, 15B–2, 15B–3, 17A, 29, 29–A, and 139 of *Puccinia graminis* f.sp. *tritici* at both 60° and 80° F. in the greenhouse; Redman was resistant to all except 15B–1, –2, and –3, and was somewhat more susceptible to 12 at the lower temperature than at the high. McMurachy [see next abstract], Selkirk [loc. cit.], Red Egyptian, *Triticum timopheevi*, Frontana × Thatcher II–47–37, Kentana, and K58 were more susceptible at the high temperature to some of the races than at the low.

Forsyth (F. R.). **Interaction of temperature and light on the seedling reaction of McMurachy Wheat to race 15B of stem rust.**—*Canad. J. Bot.*, 34, 5, pp. 745–749, 1 diag., 1956.

At the Plant Pathology Laboratory, Winnipeg, Manitoba, the reactions of McMurachy wheat seedlings to race 15B of stem rust (*Puccinia graminis*) [see preceding abstracts] were determined under various conditions of light and temperature. In seedlings kept in continuous light at temperatures alternating between 62° and 72° F. the critical period determining reaction to rust infection was at the appearance of flecking. In those grown with a photoperiod of 16 hours rust resistance was induced if a combination of light and a temperature of 60° fell between 51 and 115 hours after inoculation. The effects of the cool, light periods in inducing rust resistance are cumulative. The evidence strongly suggests that rust resistance in Selkirk and McMurachy when grown under conditions obtaining in Manitoba [see above, p. 176], with about 7 hours of cold light daily in June and July, is influenced by these factors, though the mechanism is as yet unknown.

Shukla (T. N.). **Factors affecting variability in cereal rust reactions. III. Variability due to age of the host.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 201–202, 1956.

In further investigations [cf. 34, p. 585] at the University of Minnesota the susceptibility of three wheat varieties to race 15B [see preceding abstracts] of *Puccinia graminis tritici* was studied in the greenhouse (day temperature 75° to 90° F., night 55° to 75°) in relation to the stage of development of the host. Lee and Stewart were very susceptible at all ages. Six-day-old seedlings of K58 showed a 3 cn. infection type and general leaf tip necrosis, while at 36 and 60 days infection was moderate (1 to 1++) with no general leaf tip necrosis.

Wells (D. G.), Caffey (H. R.), & Akhter (S. W.). **Inheritance of reaction to leaf rust of Wheat caused by Puccinia triticina Eriks. in a cross involving a Fronteira derivative.**—*Agron. J.*, 48, 11, pp. 530–531, 1956.

At the Mississippi Agricultural Experiment Station the genetics of the mature plant reactions to leaf rust (*Puccinia triticina*) [35, p. 362] of a wheat cross involving Coker 47–27, C.I. 12563 (of Fronteira parentage), and Michigan Amber were

investigated. Michigan Amber was very susceptible to *P. triticina* at all stages of growth while Coker 47–27, selected from a cross between Fronteira and Hardired, was susceptible only in the seedling stage. In the test natural infection of leaf rust in the nursery was supplemented by the addition of races 5, 58, and 122. The F_3 data revealed one major factor pair governing leaf rust reaction and dominance of resistance.

In another study (M. Hashim. Thesis of the University of Minnesota, 1951) field resistance of Frontana to a collection of leaf rust races revealed a two-duplicate factor difference in the cross Newthatch × Frontana and a one-factor difference in Thatcher × Frontana. It was thought that Thatcher carried one resistance factor closely linked with an inhibitor. Fronteira was the sole source of resistance to *P. triticina* in both Frontana and Coker 47–27, so these two studies have given different results.

The symbol Lr_F is proposed to designate the factor governing leaf rust resistance in Coker 47–27.

Hiratsuka (N.) & Miyashita (S.). **Studies on the rust-resistance of cereals, V. Susceptibility of various species of Triticum and its related genera to the yellow rust of Wheat, Puccinia glumarum.**—*Jap. J. Breed.*, 5, 3, pp. 193-201, 1955. [Japanese, with English summary.]

The results of inoculation with uredospores of *Puccinia glumarum* race 31 on seedlings of 80 species and 171 strains of *Triticum*, *Aegilops*, *Hordeum*, *Agropyron*, *Elymus*, oats, *Haynaldia villosa*, *Lolium remotum*, *Aegilotrichum*, *Agrotrichum*, and *Bromus* are presented [cf. 34, p. 142].

Larter (E. N.) & Elliott (F. C.). **An evaluation of different ionizing radiations for possible use in the genetic transfer of bunt resistance from Agropyron to Wheat.**—*Canad. J. Bot.*, 34, 5, pp. 817–823, 2 pl., 2 graphs, 1956.

In further work at the Department of Agronomy, State College of Washington, on the transference of genes for resistance to bunt (*Tilletia* spp.) from a 56-chromosome wheat × *Agropyron* derivative to a susceptible winter wheat (Elgin) by exposing hybrid seeds to X-rays [35, p. 289] or thermal neutrons, and seedlings to radioactive isotopes of phosphorus and sulphur, the thermal neutron treatment was most suitable for this purpose, chromosome exchange taking place with greater frequency with increase in radiation, while percentage survival was not diminished.

Treatment with radio-isotopes reduced survival, but it was probably applied after tiller differentiation; better results might accrue from injection of dilute concentrations of the radio-isotope into hybrids shortly before microsporogenesis or after fertilization.

Purdy (L. H.) & Holton (C. S.). **Vapor action of fungicides used in the control of Wheat bunt.**—*Phytopathology*, 46, 7, pp. 385–387, 1956.

At the Regional Smut Research Laboratory, Washington (State) Agricultural Experiment Station, anticarie and panogen 15 inhibited the germination of *Tilletia caries* spores [35, p. 442] on water agar by vapour action, whereas agrox and ceresan M were ineffectual. Panogen 15 was the only one of the fungicides tested that controlled seed-borne infection in Elgin winter and Red Bobs spring wheat by vapour action. The treatment also produced a marked increase in plant vigour, especially in the winter wheat.

Murray (Hazel C.) & Zscheile (F. P.). **Studies on the amino acid composition and nutrient requirements of the Wheat bunt fungus.**—*Phytopathology*, 46, 7, pp. 363–366, 1956.

At the Department of Agronomy, University of California, Davis, the amino acid

composition of *Tilletia caries* [31, p. 322; cf. 35, p. 666] was determined by qualitative bi-dimensional paper chromatography of chlamydospore extracts before and after germination, in acid hydrolysates prepared from chlamydospores and mycelial cultures, in solutions exuded by mycelia, and in aqueous media after growth of mycelial cultures. In the last-named 21 amino acids were found, many of them also occurring in the chlamydospore and mycelial extracts and hydrolysates; all were formed from L-asparagine, the sole source of nitrogen.

The growth rates of the fungus on various amino acid media demonstrated the superiority of a simple one containing glycine and DL-alanine as the nitrogen source to any studied previously. Little influence on growth rate was exerted by additional supplements of single amino acids or seven other substances. Acids of the Krebs cycle failed to promote growth but L-leucine generally stimulated it. There was some evidence of mutual antagonism among amino acids. Owing to the marked capacity of *T. caries* for the synthesis of amino acids it appears unlikely that any of those under observation would act as limiting factors in chlamydospore production.

Gerstner (W.). **Möglichkeiten der Bekämpfung des Weizensteinbrandes (Tilletia tritici (Bjerk.) Winter) und der Streifenkrankheit der Gerste (Helminthosporium gramineum Rabh.) mit Antibiotika von Penicillien.** [Possibilities of the control of Wheat bunt (*Tilletia tritici* (Bjerk.) Winter) and stripe disease of Barley (*Helminthosporium gramineum* Rabh.) with antibiotics from *Penicillium* spp.] —*Phytopath. Z.*, 27, 2, pp. 183–210, 2 figs., 1956.

At the Institute for Phytopathology, Aschersleben, Germany, the author used Gassner's method for the assay of fungicides [22, p. 490] in tests to determine the efficiency of crude culture filtrates of *Penicillium* strains isolated from various sources in the inhibition of infection by *Tilletia tritici* [*T. caries*] on inoculated summer and winter wheat seed. Before inclusion in the trials the strains were subjected to streak tests against *Fusarium nivale* [*Calonectria nivalis*], *F. culmorum*, *Alternaria circinans* [*A. brassicicola*], *Rhizoctonia* [*Corticium*] *solani*, and *Helminthosporium gramineum* to determine their suitability as antibiotic-producers.

A few of the strains used in seed treatment suppressed the fungus completely without reduction of emergence, but the phytotoxicity of others could not be counteracted by lowering the concentration of the filtrates. Antibiotic efficacy was impaired by a lapse of 21 but not of 16 days between treatment and sowing. Of the various carriers tested for compatibility with the filtrates, infusorial earth (0·2 gm. per 100 gm. seed) appeared to be the most suitable.

In 1953 the treatment of stripe-diseased barley seed with *Penicillium* culture filtrates was almost, and in 1954 quite as effective as disinfection with germisan. Of the 23 strains investigated, 13 were identified as *P. expansum*, and patulin [27, p. 83; 32, p. 140, *et passim*] was present in the culture filtrate of one of them.

Nakagawa (M. [O.]). **Studies on ear-scab resistance of Wheat varieties. V. The relation of the susceptibility to ear-scab and potassium chlorate reaction and the amount of fructose contents. VI. Relation of the susceptibility to ear-scab and the decolorization velocity of methylene blue and amounts of glucose in Wheats. VII. Relation of the susceptibility to ear-scab and phosphorus content.** —*Jap. J. Breed.*, 5, 4, pp. 275–278, 278–280; 6, 2, pp. 115–116, 1956. [Japanese, with English summaries. Abs. from author.]

Wheat varieties liable to heavy damage by potassium chlorate carry the A factor for susceptibility to ear scab [*Gibberella zeae*: 35, p. 668]. They are Norin No. 12 (AABBCC), Ejima No. 1 (AAbbCC), Wichita (AABBcc), and Norin No. 50 (AAbbcc). The A-factor is hypostatic to B [cf. loc. cit.]. In these varieties the

foliage of 50-day-old seedlings and the young kernels six days after flowering contain an abundance of fructose.

The factors responsible for scab infection can be detected by the rate of decolorization of methylene blue in young kernels. Varieties carrying the B factor are more rapidly decolorized and contain larger quantities of glucose than those without it.

Phosphorus occurred in abundance in young kernels of varieties with the C factor for scab resistance. Infection is increased by the simultaneous presence of A and B.

Tyner (L. E.). **The incidence of root disease fungi in Wheat fields of central and northwestern Alberta.**—*Plant Dis. Reptr*, 40, 5, pp. 358–360, 1956.

At the Plant Pathology Laboratory, Edmonton, Alberta, *Helminthosporium sativum* [*Cochliobolus sativus*] was isolated more frequently than *Fusarium culmorum* from samples of wheat stubble [35, p. 8] from central Alberta, whereas the latter was the more frequent in samples from north-western areas in each of the five years (1951–5) of study. Differences in distribution of the two pathogens are thought to be due to climatic factors [cf. 36, p. 94], the crop maturing earlier in the north-west, where the days are longer during the growing season. Most of the soil samples taken from fields throughout the two regions and sown with Thatcher wheat in the greenhouse contained root pathogens which caused considerable infection both in the greenhouse and in the field.

Cherewick (W. J.) & Cunningham (R. H.). **Further improvements in the partial-vacuum method of inoculation with loose smut fungi.**—*Phytopathology*, 46, 7, pp. 355–358, 2 figs., 1956.

It was shown by experiments at the Plant Pathology and Cereal Breeding Laboratories, Winnipeg, Canada, that the efficiency of Moore's partial-vacuum method for the inoculation of wheat with *Ustilago tritici* and barley with *U. nuda* can be further increased [30, p. 264] by selection of spikes at the optimum stage of development (when the earliest flowering florets contain ovaries about half the size of mature kernels), repetition of the evacuation process three to five times, and use of a power-driven stool pump worked by a 1/20 h.p. electric motor at 54 strokes per minute, instead of a hand-operated pump.

Critopoulos (P.). **Perpetuation of the brown rust of Barley in Attica.**—*Mycologia*, 48, 4, pp. 596–600, 1956.

Inoculations at the Department of Botany, University of Athens, with aecidiospores of *Puccinia anomala* [*P. hordei*] from wild *Ornithogalum umbellatum* [cf. 27, p. 560] on to potted Athinais barley plants in January and February, 1955, resulted in the production of uredosori 10 days later, and teleutosori in the middle of April. Teleutospores on field barley growing near the source of the aecidia gave rise to basidiospores during the following November for the infection of *O. umbellatum*. Barley plantings are well advanced by the time aecidia appear and the plants readily become infected.

Ludwig (R. A.), Clark (R. V.), Julien (J. B.), & Robinson (D. B.). **Studies on the seedling disease of Barley caused by Helminthosporium sativum P.K. & B.**—*Canad. J. Bot.* 34, 4, pp. 653–673, 4 pl., 9 graphs, 1956.

At the Faculty of Agriculture, McGill University, Quebec, a method was developed for obtaining uniform development in barley seedlings inoculated with *Helminthosporium sativum* [*Cochliobolus sativus*: cf. 12, p. 561; 20, p. 397] by use of a standard sand-maizemeal-nutrient salt medium on which *C. sativus* had grown for seven to 14 days and which was incorporated in the planting soil. A layer of

infested soil immediately below the seed ensures heavy infection. Treatments were applied to bands of ten seedlings 3 in. apart, and replicated five times, results being measured by plant height.

Experiments involving leaching and the use of filtrates from cultures of the pathogen indicated that a toxin or toxins, distinct from those formed on addition of organic matter to soil, are produced by *C. sativus* and augment disease incidence in the seedlings. These toxic substances are, however, adsorbed by different soils to a varying degree, a factor of importance in relation to disease severity.

HOOKER (A. L.). **Association of resistance to several seedling root, stalk, and ear diseases in Corn.**—*Phytopathology*, 46, 7, pp. 379–384, 1956.

At the Iowa Agricultural Experiment Station in 1953 and 1954 the author measured the reactions of 25 inbred lines of dent maize to separate and joint inoculation with two agents of basal stalk rot, *Diplodia zeae* and *Gibberella zeae* [4, p. 665; 17, p. 811; 35, p. 292, *et passim*]. Determinations were also made of the responses of the lines to natural infections which caused basal stalk rot, root necrosis, and ear rot. Greenhouse inoculations on seedlings were also performed with *D. zeae*, *G. zeae*, *Pythium debaryanum*, and *P. graminicola* [35, p. 672].

Differences among the maize lines were statistically significant in all evaluations. Highly significant correlations were established between the stalk rots, including those with root necrosis, and among the four seedling blights. In 1953 there was little evidence of a connexion between stalk rot in the internode below the ear and the other forms of stalk rot and root necrosis. The two ear rots induced by *D. zeae* and *G. zeae* were not correlated reciprocally or with other disease reactions.

Lines B2, B6, B14, C103, W22, and 187–2 were among the most resistant to the stalk rots and root necrosis. All lines were relatively susceptible to the spread of *D. zeae* in the internode below the ear. The highest degree of resistance to seedling blights was found in A73, 82, 225, 829, L317, and N6. The lowest percentages of double ear rot occurred in lines A73, Ia153, 82, 829, 187–2, B6, B14, 502, and M14, but Ia153 was very susceptible to stalk rot. Ear rot due to *D. zeae* was most severe in C103, N6, and 225, while *G. zeae* caused considerable infection in B2, Os420, N6, 187–2, and 38–11.

LENG (E. R.) & KOEHLER (B.). **1955 Illinois Corn tests.**—*Bull. Ill. agric. Exp. Sta.* 598, 29 pp., 1 map, 1956.

In a survey of maize diseases in Illinois in 1955 [cf. 35, p. 672] smut [*Ustilago maydis*] was found to have caused a 2 per cent. reduction in yield, damage being greatest in the north. Stalk rot caused by *Gibberella* [*zeae*] was unusually common, and that due to *Diplodia* [*zeae*] generally average. The incidence of charcoal rot [*Macrophomina phaseoli*: 34, p. 364] was the highest ever recorded in the State, the southern areas being the most affected; infection was usually below the soil surface.

A propos du 'stubborn'. [On stubborn disease.]—*Fruits Prim. Afr. N.*, 25, 265, pp. 77–78, 1955. [Received December, 1956.]

This communication from the Horticultural Service, Rabat, Morocco, reports that for the past three or four years symptoms of stubborn disease [cf. 33, p. 227] have appeared with increasing frequency on orange trees in Morocco, particularly in young (4- to 6-year-old) plantations. The varieties chiefly affected are Washington Navel and Virginia Lake. Import of healthy stocks is the only remedy at present, and scions also should be studied for resistance to psorosis [30, p. 565], which will probably become widespread in Morocco as orange trees reach the age (15 to 20 years) when symptoms first appear.

Terreros (J. M.) & Cardeñosa (R. B.). **Psorosis de los Cítricos en la estación agrícola experimental de Palmira?** [Psorosis of Citrus at the Palmira Agricultural Experiment Station?]—*Agricultura trop.*, 11, 3, pp. 265–267, 1 fig., 1955.

Investigation of a disease of some years' standing in orange and grapefruit at Palmira, Colombia, revealed a close conformity of the symptoms with those of psorosis virus [map 65]. In an attempt to confirm the virus nature of the disease leaf material from infected trees was inoculated into healthy trees, some of which developed limited lesions. The authors consider that the identity of the disease is as yet not certain.

Taboada (V. L.). **Empleo del método histológico (H. Schneider) para determinar 'tristeza' en las plantas cítricas en la Provincia de Tucumán.** [Utilization of the histological method (H. Schneider) to diagnose 'tristeza' in Citrus nurseries in the Province of Tucumán.]—*Rev. industr. agríc. Tucumán*, 39, 10–12, pp. 76–77, 1955. [Received December, 1956.]

In studies at the Agricultural Experiment Station, Tucumán, Argentina, Schneider's method [29, p. 362] showed that tristeza virus [36, p. 99] on 10- to 15-year-old Jaffa oranges grafted on sour orange rootstock caused anatomical changes [33, p. 671] which increased in proportion to the intensity of the tristeza symptoms.

Hastie (M. S.). **Nyanza Province. Cotton experiments.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp. (Kenya), 1955–56*, pp. 1–10, 1956.

In reference to diseases (pp. 3–5) it is stated that during 1955–6 damage by bacterial blight (*Xanthomonas malvacearum*) to cotton in Kenya [32, p. 376] was the worst experienced since 1951–2, particularly in parts of North Nyanza and Suna and Kabondo in South Nyanza. *Verticillium* wilt [*V. dahliae*: cf. 36, p. 27] was recorded for the first time on cotton in Kenya in a very small area at Kibos.

Green (J. M.) & Brinkerhoff (L. A.). **Inheritance of three genes for bacterial blight resistance in upland Cotton.**—*Agron. J.*, 48, 11, pp. 481–485, 2 figs., 1956.

Studies at the Oklahoma Agricultural Experiment Station confirm that the resistance of Stoneville 20 cotton to bacterial blight (*Xanthomonas malvacearum*) [31, p. 432] is controlled by a major recessive gene, but that segregation is obscured by other genes of lesser individual effect. It is suggested that the symbol for Stoneville 20 resistance should be b_7 [cf. 33, p. 481]. Resistance in 1–10–B–4–B, 20–8–1–3–1, and 6–77–5–8 appears to be controlled by single dominant genes, B_1, B_N, and B_S, respectively, B_1 being independent of b_7 and B_N. B_N and B_S could be the same gene or closely linked.

Knight (R. L.). **The genetical approach to disease resistance in plants.**—*Emp. Cott. Gr. Rev.*, 33, 3, pp. 191–196, 1956.

In this paper, read at the Annual Meeting of the British Association for the Advancement of Science, held at Bristol in September, 1955, the author discusses (with particular reference to cotton) the origin of resistance to plant diseases in nature; the assessment of resistance for breeding purposes; the search for resistance by collecting and studying species and varieties of the crop; and the transfer of resistance by backcrossing.

Dark (S. O. S.) & Saunders (J. H.). **Shambat Station.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp. (Sudan), 1955–56*, pp. 13–20, 1956.

Referring to diseases (pp. 19–20), the authors state that in 1955–6 there was little natural infection of cotton by blackarm [*Xanthomonas malvacearum*: 35, p. 423]

at Shambat cotton breeding station, Republic of the Sudan. Powdery mildew (*Leveillula taurica*) [cf. 33, p. 411], not before recorded on cotton locally, was present on the leaves of some out-of-season plants.

Flor (H. H.). **Mutations in Flax rust induced by ultraviolet radiation.**—*Science*, 124, 3227, pp. 888–889, 1956.

At the Field Crops Research Branch, United States Agricultural Research Service, Fargo, North Dakota, spores of the hybrid culture race 22 × race 1–A of *Melampsora lini* [35, p. 891] were exposed to ultra-violet radiation for ten minutes at a distance of 4 in. from a 30-watt tube. About 10 per cent. of the spores survived. Mutants were obtained that attacked six flax varieties resistant to non-irradiated uredospores. Although no mutant was secured from the Birio variety, the mutants from Barnes and Wilden attacked it. It is concluded that mutations are a factor in the development of new races of flax rust.

Kommedahl (T.), Christensen (J. J.), Culbertson (J. O.), & Moore (M. B.). **The prevalence and importance of damaged seed in Flax.**—*Tech. Bull. Minn. agric. Exp. Sta.* 215, 40 pp., 9 figs., 9 graphs, 1955. [Received October, 1956.]

This account of co-operative investigations into the importance of damaged flax seed in Minnesota and elsewhere in North America [cf. 27, p. 133; 31, p. 117; 32, p. 314; 35, p. 451], carried out from 1942 to 1953 by the Minnesota Agricultural Experiment Station and the Field Crops Research Branch, United States Department of Agriculture, deals with the nature, distribution, and occurrence of split seed coats (natural damage), cracked seed (mechanical damage), blighted seed (weathered or discoloured), the mycoflora of seed, amount of damaged seed in Minnesota, relationship of seed damage to germination and seedling injuries, seed treatment, and correlation between percentage of damaged seed and seed colour, size, oil content, and iodine number. Percentage germination is directly related to the number of undamaged seeds.

The genera of fungi most commonly isolated were *Alternaria* [24, pp. 231, 268] and *Colletotrichum* [34, p. 367]. Seed from all the major flax-growing regions of North America was infected to some degree in each year of the survey and averaged 57 per cent. infection in Minnesota in 1952. Location more than variety determined incidence. *Alternaria* was present in most samples, reaching 89 per cent. at Kanawha, Iowa, and 45 per cent. at Winnipeg, Canada. Blighted or black seed was commonly infected; Bison was very susceptible and Renew much less so. *C. lini* [*C. linicola*] was more prevalent in humid areas than in dry and caused up to 50 per cent. infection; Bolley Golden was the most highly infected variety and Renew the least.

Chemical treatment of damaged seeds greatly improved seedling stands, often doubling them, and increased seedling vigour and yield of seeds. All flax seed sown in Minnesota should be treated with a suitable fungicide.

Vasudeva (R. S.), Sethi (C. L.), & Lele (V. C.). **New physiologic race of Melampsora lini (Ehrenb.) Lév., in India.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 199–200, 1956.

At the Indian Agricultural Research Institute, New Delhi, one sample of *Melampsora lini* [33, p. 424] from the 1952–3 linseed crop in the Punjab caused distinct reactions, particularly on the Argentina (C.I. 705–1) and Koto varieties, both of which are either immune from or highly resistant to the four previously recorded races [loc. cit.] of *M. lini*. This new race, which has been designated I_5, produced semi-resistant reactions on Argentina (C.I. 705–1) and small resistant pustules on Koto.

Rogash (A. R.). Вегетативная гибридизация в селекции Льна-долгунца. [A vegetative hybridization in the selection of long-fibred Flax.]—Агробиология [*Agrobiology, Moscow*], *1956*, 3, pp. 89–94, 1956.

At the Pan-Soviet Scientific Research Institute of Flax, Torzhok, U.S.S.R., top-grafting established, long-fibred varieties of flax on to geographically distant varieties (from Morocco, Italy, or Argentina) or on wild flax yielded combinations with increased disease resistance and higher yields of fibre and seed.

In 1949 there was little improvement in resistance to rust [*Melampsora lini*: 31, p. 116] in the first generation graft combination. In 1952, however, among plants of the combinations 8063/Argentine 05037 and 8063/Safedak 05125, 45 and 91·3 per cent., respectively, were healthy as against 12·1 per cent. of the control, 8063. Similarly, I–5/Argentine 05037 and Pryadil'shchik [Spinner]/Morocco 05047 yielded 40·3 and 52·1 per cent. healthy plants while all the controls (I–5 and Pryadil'shchik) were infected.

Resistance to fusariosis [*Fusarium lini*: 20, p. 534] was observed in 1949 in Pryadil'shchik/Yugoslavsky and Pryadil'shchik/Bokhara 392, both with 37·5 per cent. healthy plants as against 0 to 14·3 per cent. in Pryadil'shchik. In 1951 and 1952 forms were obtained with 75 per cent. (Svetoch [Torch]/V-1143], 87·5 per cent. (Pryadil'shchik/*L*[*inum*] *perenne*), and 100 per cent. (8063/Safedak 05125) healthy plants, whereas there were none among the controls (Svetoch, Pryadil'shchik, and 8063).

Increased resistance to anthracnose [*Colletotrichum linicola*: 35, p. 609] was obtained by grafting Tekstiljshchik [Textile Worker] and 123 4/2 on *L. perenne*.

Scheffer (R. P.) & Haney (W. J.). **Causes and control of root rot in Michigan greenhouses.**—*Plant Dis. Reptr*, 40, 6, pp. 570–579, 2 figs., 1956.

Studies carried out by the Departments of Botany and Plant Pathology and of Horticulture, Michigan State University, East Lansing, showed *Rhizoctonia* [*Corticium*] *solani* and *Pythium ultimum* to be the most important pathogens on Croft lilies (*Lilium longiflorum* var.) [34, p. 648], poinsettia [*Euphorbia pulcherrima*: 35, p. 299], and other greenhouse plants affected by root rot in Michigan. *Fusarium* spp. are not important. The former fungi are believed to be introduced into the greenhouses on field-grown bulbs. They are generally not host-specific and present serious problems. *P. ultimum* from Croft lilies was pathogenic to *Lilium pumilum* seedlings, *L. longiflorum* var. Georgia, poinsettia, and sweet pea amongst other plants, and appears to be identical with the *Pythium* from poinsettia. None of the bulb and soil treatments tested was effective on Croft lilies. For poinsettia soil steaming proved superior to chemicals. PCNB, used as a soil fungicide, controlled *C. solani*, benefited germination and growth, and had good residual properties, but it was ineffective against *P. ultimum*. Captan, used as a soil mixture at high concentrations, inhibited both fungi, but it had poor retention. Certain pyridinethione derivatives were effective and fairly stable, but they are not yet available commercially.

Parmelee (J. A.). **The identification of the Curvularia parasite of Gladiolus.**—*Mycologia*, 48, 4, pp. 558–567, 9 figs., 1956.

Studies at the Botany and Plant Pathology Laboratory, Canada Department of Agriculture, Ottawa, established that the inserted hilum of *Curvularia lunata* serves to distinguish the species from *C. trifolii* [35, pp. 792, 892]. The fungus on gladiolus has a protruding hilum. However, as *C. trifolii* from clover (*Trifolium repens*) infected only its own host, while the gladiolus strain was innocuous to clover, a new form is made, *C. trifolii* f.sp. *gladioli* Parmelee & Luttrell, for the latter.

Hättingen (Ruth). **Sclerotinia an Gladiolen.** [*Sclerotinia* on Gladioli.]—*Bayer. landw. Jb.*, 33, 1, pp. 47–52, 3 figs., 1956.

The symptoms of the dry rot of gladiolus caused by *Sclerotinia gladioli* are briefly described and recommendations made for its control on the basis of experience at a horticultural institute in Bavaria, Germany [cf. 35, p. 768]. Promising results have been obtained by one hour's disinfection of the corms in 0·25 per cent. ceresan [cf. next abstract] and soil treatment with brassicol (30 gm. per sq. m.). Infected corms planted in soil treated with 0·1 per cent. ceresan three times at 10- to 14-day intervals produced 60 per cent. healthy progeny compared with 100 per cent. from sound corms planted alternately in the rows.

The store must be ventilated, at temperatures not exceeding 10° C., and diseased corms constantly removed.

Jefferson (R. N.), Bald (J. G.), Morishita (F. S.), & Close (D. A.). **Effect of vapam on Rhizoglyphus Mites and Gladiolus soil diseases.**—*J. econ. Ent.*, 49, 5, pp. 584–589, 1 fig., 1956.

Rhizoglyphus mites are closely associated in southern California with soil-borne diseases of gladiolus, especially the wilt caused by *Fusarium oxysporum* f. *gladioli* [35, p. 526], root rot (*Stromatinia* [*Sclerotinia*] *gladioli*) [see preceding abstract], and bacterial scab (*Pseudomonas marginata*) [34, p. 787]. In experiments in 1954 and 1955 in heavily infested soil, vapam [35, p. 31] increased flower and corm yields and reduced infection by the mites, *P. marginata*, *F.o.* f. *gladioli*, and probably *S. gladioli*. For the varieties tested, including Spotlight and Evangeline, all dosages (215, 430, 460, and 1,720 lb. per acre) significantly increased cormel yields, but corm production was raised to a comparable extent only by the two highest levels. Dipping the planting stock in new improved ceresan [cf. preceding abstract] resulted in irregularities in the effects of increasing dosages of vapam on *P. marginata*, which are tentatively attributed to a disturbance in the balance between the pathogen and its antagonists among the microflora of the planting stock and soil.

Capretti (C.). **Simbiosi tra 'Darluca filum' (Biv.) Cast. e la ruggine delle Cariofillacee 'Puccinia arenariae' (Schum.) Wint. su foglie di 'Dianthus barbatus' L.** [Symbiosis between *Darluca filum* (Biv.) Cast. and the rust of the Caryophyllaceae *Puccinia arenariae* (Schum.) Wint. on leaves of *Dianthus barbatus* L.]—*Riv. Ortoflorofruttic. ital.*, 39, 9–10, pp. 455–459, 4 figs., 1955. [Received 1956.]

At the Institute of Forest and Agricultural Pathology, University of Florence, Italy, the author examined spotted leaves of *Dianthus barbatus* plants bearing *Puccinia arenariae* [cf. 33, p. 523] on the lower surface of the lesions and *Darluca filum* on the upper. The relationship between the two fungi appeared to be symbiotic only.

Cooper (A. J.). **The influence of cultural conditions on the development of Alternaria leaf spot of Cinerarias.**—*J. hort. Sci.*, 31, 4, pp. 229–233, 1956.

Both mature and immature leaves of cineraria were susceptible to artificial infection by *Alternaria senecionis* [29, p. 415] in tests at the Department of Horticulture, University of Reading. The rate of spread within the leaf tissues was extremely slow in immature leaves but more rapid in mature ones. Heavy watering significantly increased it. In preliminary manuring trials under normal greenhouse conditions, using John Innes compost, an increase of phosphate from May to October was without effect, while an increase in nitrogen from February to June decreased the rate of spread. From September to February various combinations

of nitrogen and phosphate had no effect, irrespective of whether the plants were heavily or lightly shaded, but from March to August increases in nitrogen at the lower light intensity decreased the rate of spread, as did increase of superphosphate at the higher intensity.

Šutić (D.). **Prilog proučavanju bacterioze na Čičku.** [A contribution to the study of bacteriosis on Burdock.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1956*, 33, pp. 27–34, 1956. [English summary.]

The bacterium causing a disease of burdock (*Arctium lappa*) [29, p. 308] in several localities in Yugoslavia is stated to be non-pathogenic to *Zinnia elegans* and to differ from *Xanthomonas nigromaculans* f. *zinniae* [loc. cit.] in certain respects. On account of its polar flagella the author considers the bacterium from *A. lappa* should be referred to *Pseudomonas*.

Verona (O.) & Bozzini (A.). **Sul 'carbone' del Polygonum baldschuanicum.** [On the 'smut' of *Polygonum baldschuanicum*.]—*Phytopath. Z.*, 27, 4, pp. 461–466, 3 figs., 1 graph, 1956. [German summary.]

Polygonum baldschuanicum, cultivated as an ornamental near Verona, is subject to infection by *Ustilago raciborskiana*, the agent of witches' broom [12, p. 550], here reported for the first time from Italy. Symptoms of the disease include shortening of the internodes and a typically erect growth habit of the branchlets, chlorosis and irregular rotundity of the leaves, and rigidity of the inflorescences, while the flowers are crowded into a spike.

Discussing the taxonomy of the smut, which occupies a position close to and intermediate between *U. anomala* and *U. carnea*, the authors refer to Hirschhorn's amalgamation of the latter with the former species [27, p. 45]. If this is accepted, it would appear logical also to refer *U. raciborskiana* to *U. anomala*, or at the most to accord it varietal rank.

Săvulescu (T.) & Săvulescu (Olga). **Două specii de Ustilago noi pentru tara noastră, parazite pe Graminaceae : Ustilago bullata Berk. și Ustilago vavilovi Jacz.** [Two species of *Ustilago* new to our country, parasitic on Graminaceae: *Ustilago bullata* Berk. and *Ustilago vavilovi* Jacz.]—*Comun. Acad. Repub. pop. rom.*, 5, 1, pp. 77–87, 6 figs., 2 graphs, 1955. [Russian and French summaries. Received October, 1956.]

This is a critical study of the taxonomy, morphology, and biology of *Ustilago bullata* [cf. 27, p. 240 *et passim*], detected for the first time in Romania during the summer of 1953 on *Agropyron tenerum*, and of *U. vavilovi* on rye [6, p. 123; 7, p. 617], which was observed sporadically in different localities in 1947, 1952, and 1954.

The characters of the local collections of *U. vavilovi* are in complete agreement with those described by Jaczewski in the U.S.S.R., the only country from which the smut has hitherto been reported.

Rojas M. (E.). **Hacia la creación de tipos de Girasol resistentes a la roya.** [Towards the breeding of rust-resistant varieties of Sunflower.]—*Bol. Exp. agropec., Lima*, 4, 1, pp. 2–6, 1955. [Received November, 1956.]

Rust (*Puccinia helianthi*) of sunflower was first observed in Peru at the end of 1950, and in 1952 experiments were initiated at La Molina Agricultural Experiment Station for the breeding of resistant varieties from selections received from the Dominion Experimental Station, Morden, Manitoba [35, p. 301]. It has been observed that resistance is dominant in the F_1 and several satisfactory selections have recently been made in the F_4.

Hutton (E. H.) & Grylls (N. E.). **Legume 'little leaf', a virus disease of subtropical pasture species.**—*Aust. J. agric. Res.*, 7, 2, pp. 85–97, 1 pl., 1956.

Pasture legumes growing in experimental plots at Strathpine Experiment Station, near Brisbane, are affected by a disease, 'little leaf', apparently related to lucerne witches' broom virosis [cf. 34, p. 515]. A few months after planting the leaves of such plants as *Desmodium uncinatum*, *D. canum*, *Crotalaria intermedia*, and *Stylosanthes gracilis* are puckered, with interveinal chlorosis. Green, distorted flower buds develop on some branches. The terminal buds of infected shoots produce small, rounded, pale leaves, and this phase is often followed by the production of small, spindly shoots bearing small leaves. Proliferation from the leaf axils may occur anywhere on the plant. Infected plants of the more upright species sometimes have a lopsided appearance owing to proliferation at the base on one side. Most diseased plants of *D. canum* and the upright strains of *D. uncinatum* died in two seasons. In the other perennial species 5 to 80 per cent. of the plants were still alive after two seasons. In two strains of *S. gracilis* (C.P.I. 11490 and C.P.I. 11491) 80 per cent. of the affected plants persisted in an appressed condition for three seasons. Annuals, e.g. *Crotalaria* spp., frequently died prematurely.

Transmission tests showed that the vector was *Orosius argentatus* [33, p. 125]. Progeny of insects taken directly from the field in Queensland and reared in the laboratory were efficient vectors, but the Canberra strain bred in the laboratory failed to transmit the disease.

Most species and strains of *Crotalaria*, *Desmodium*, *Indigofera*, and *Stylosanthes* became naturally infected, though a few were resistant and also possessed promising agronomic characters. Lucerne and white clover (*Trifolium repens*) were relatively resistant. The species and strains of *Arachis*, *Centrosema*, *Dolichos*, *Glycine*, *Lespedeza*, *Leucaena*, *Pueraria*, *Phaseolus*, *Vigna*, and *Zornia* tested were all markedly field-resistant, except *D. striatus* C.P.I. 17082.

The fact that the disease appeared in an isolated planting within four months of seeding suggests that it is spread from indigenous and naturalized plants.

Webster (J.). **Succession of fungi on decaying Cocksfoot culms. Part I.**—*J. Ecol.*, 44, 2, pp. 517–544, 4 graphs, 2 diags., 1956.

This paper details the succession of fungi (species and numbers) collected on decaying cocksfoot (*Dactylis glomerata*) culms in three localities near Sheffield in a two-year period following flowering, and discusses the distribution of the more common species in relation to the anatomy and physiology of the plant. The main sections cover localities and methods; morphological, anatomical, and physiological variations in the culm; physical variations within a cocksfoot tussock; and the succession of fungi on decaying stems.

The most common parasitic species were *Selenophoma donacis*, *Erysiphe graminis*, and *Mastigosporium rubricosum* [see next page].

Desai (M. V.) & Prasad (N.). **Fusarium blight of Guar.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 112–123, 2 pl., 1956.

A new and destructive disease of guar (*Cyamopsis tetragonoloba*), characterized by black streaks near the leaf axils, was observed at the Agricultural Institute, Anand, India, in 1949. Three out of 16 isolates from the lesions were found to be pathogenic, all three being identified as *Fusarium moniliforme* [*Gibberella fujikuroi*: 31, p. 557]. None of the isolates infected other hosts growing during the same season. Incidence was highest in ill-drained black soils and on crops sown in August, and is favoured by high humidity and high temperature in late September. Damage in 1949 and 1950 varied from 10 to 50 per cent.

Self (R. L.) & Driver (C. H.). **A Physalospora disease of lawn grass.**—*Plant Dis. Reptr*, 40, 6, p. 509, 1 fig., 1956.

A new disease of St. Augustine lawn grass (*Stenotaphrum secundatum*) superficially resembles brown patch [cf. 35, p. 192] but there are numerous dark perithecia embedded in the tissue of the leaf blades, which died from the point of attachment to the sheath toward the tip of the blade. It was observed in July, 1955, to be destroying large areas of lawns in the Spring Hill area of Mobile, Alabama. The fungus responsible for the disease was tentatively identified as a species of *Physalospora*.

Creelman (D. W.). **The unusual occurrence of three leaf-spotting fungi on grasses in Nova Scotia.**—*Plant Dis. Reptr*, 40, 6, pp. 510–512, 4 figs., 1956.

In Nova Scotia in 1955 *Heterosporium phlei* [27, p. 528], *Mastigosporium rubricosum* [30, p. 324], and *M. album* [34, p. 154] caused eyespot symptoms on and considerable fodder yield reductions of timothy (*Phleum pratense*), orchard grass (*Dactylis glomerata*), and meadow foxtail (*Alopecurus pratensis*), respectively, constituting new records of these fungi for the Province.

McKinney (H. H.). **A virus from Orchard Grass that infects Oats.**—*Plant Dis. Reptr*, 40, 6, pp. 524–526, 3 figs., 1956.

A preliminary account is given of a virus found in 1949 in orchard grass (*Dactylis glomerata*) at Wallingford, Massachusetts, which may prove identical with that occurring on the same grass in England [32, p. 630] and when inoculated to Letoria oats causes symptoms similar to the blue dwarf disease (abs. in *Phytopathology*, 42, p. 471, 1952). The symptoms, typical of grass mosaics, are described. Infection was difficult to achieve using carborundum, and negative results were obtained with cereals other than oats, some other grasses, and tobacco.

Baxter (J. W.). **Cercospora black stem of Alfalfa.**—*Phytopathology*, 46, 7, pp. 398–400, 2 figs., 1956.

At least two fungi appear to be associated with the important black-stem complex of lucerne, red clover, and *Melilotus officinalis* in Iowa, *Ascochyta imperfecta* [35, p. 461] and *Cercospora medicaginis* [35, p. 20], the latter regarded as synonymous with *C. zebrina* by Horsfall [9, p. 319] but as a distinct species by Chupp [33, p. 635]. *A. imperfecta* predominates during the spring and late autumn, and *C. medicaginis* from mid-June until the early autumn, causing leaf spot in the early stages of infection and stem discoloration later. The stem lesions formed by *C. medicaginis* are of a lighter colour (reddish- to chocolate-brown) than those produced by *A. imperfecta*, which are blackish-brown to black. *C. medicaginis* overwinters mainly in the form of mycelium in plant refuse, the incidence of seed infection in lucerne apparently being low.

The optimum temperature for growth and conidial germination of *C. medicaginis* in pure culture was near 25° C. Sporulation occurred only on carrot leaf agar, sterile stems of the above-mentioned hosts, or in carrot decoction among a number of media tested, but it could also be induced by flooding plates and slants of non-acidified potato dextrose agar with mycelial suspensions of two- to four-week-old isolates or by growth in shake cultures of a mixture of Richards's solution and malt extract.

In greenhouse inoculation tests *C. medicaginis* was pathogenic only to lucerne, *Medicago lupulina*, and *M. hispida*; red clover, *Melilotus officinalis*, and *M. alba* reacted negatively. Penetration by germinating conidia took place through the stomata, without the formation of appressoria, 48 hours after inoculation. Direct penetration was not observed.

Goto (M.). **A bacterial leaf blight of Clover.**—*Agric. & Hort., Tokyo*, 31, 10, pp. 1415–1416, 1956. [Japanese.]

A leaf blight of Ladino and white clovers causes severe damage in Shizuoka Prefecture, Japan, but red clover is usually free from infection. It was proved by inoculation that the causal organism induces a soft rot of various vegetables. It was identified as *Pseudomonas cichorii*, which does not differ in pathogenicity from *P. marginalis* [cf. 34, p. 340].

Sommereyns (G.). **Sur l'identification des viroses des arbres fruitiers par voie biochimique.** [On the identification of virus diseases of fruit trees by biochemical means.]—*Fruit belge, 1956*, 178, pp. 81–87, 1956.

With 32 references to the relevant literature the author outlines briefly the methods of identifying virus infections of fruit trees by chemical techniques, involving colour reactions; by physical techniques, based on absorption spectroscopy of leaf extracts; and by grafting on to susceptible index hosts, which he considers still the most reliable.

Heuberger (J. W.), Comegys (W. R.), & Romanko (R. R.). **Captan and zineb, used alone, in alternation, and in combination . . . and the control of Apple diseases.**—*Plant Dis. Reptr*, 40, 6, pp. 467–477, 1956.

From 1953 to 1955, inclusive, captan and zineb were tested alone, in alternation, and in combination for the control of apple diseases at Bridgeville and Newark, Delaware. Captan used alone was superior to zineb in controlling scab (*Venturia inaequalis*) [35, p. 378] and for fruit finish, whereas zineb alone was superior to captan against sooty blotch (*Gloeodes pomigena*) [loc. cit.], cedar rust (*Gymnosporangium juniperi-virginianae*) [loc. cit.], and possibly fireblight (*Erwinia amylovora*) [35, p. 616]. Neither was satisfactory alone as an all-season spray. The combination of the two (half strength of each) was effective against all the diseases present, was non-injurious, resulted in the best fruit finish, and left residues much lower than the established tolerances for both. Alternating captan and zineb was equally effective, except possibly for fruit finish. The combination, however, is better in practice and should have a definite place in the late cover spray period. It should also be used in the period from full pink to first cover where cedar rust and fireblight are troublesome.

Black spot of Apple and Pear.—*Agric. Gaz. N.S.W.*, 67, 8, pp. 425–427, 2 figs., 1956.

Much of the information in this article on the control of black spot [scab: *Venturia inaequalis* and *V. pirina*] on apples and pears in New South Wales has already been noticed [35, p. 661]. The cost of pre-leaf fall phenyl mercuric chloride treatment is £25 to £30 per acre for medium-sized trees. It is only effective in well-isolated orchards or in districts treated throughout. Then treatment in two successive autumns, with protective spraying in the intervening season, is likely either to eliminate the disease altogether or to render only one annual autumn treatment necessary thereafter.

Spangello (L. P. S.), Julien (J. B.), Racicot (H. N.), & Blair (D. S.). **Breeding Apples for resistance to scab.**—*Canad. J. agric. Sci.*, 36, 5, pp. 329–338, 1956.

In co-operative trials by the Horticulture Division, Experimental Farms Service, and the Botany and Plant Pathology Division, Science Service, Canada Department of Agriculture, Ottawa, scab (*Venturia inaequalis*) resistance of several small-fruited *Malus* selections has been transmitted to the progenies of crosses with commercial apple varieties [35, p. 419]. Selecting and backcrossing these scab-resistant seedlings two or three times to good-quality varieties should yield resistant

segregates with desirable commercial fruit characters. Since certain scab-resistant selections are also resistant to mildew (*Podosphaera leucotricha*) [loc. cit.], it should be possible to develop commercial varieties resistant to both diseases.

HÅRDH (J. E.). **Omenaruven leviämisestä ja torjunnasta.** [The spread and control of Apple scab.]—*Valt. Maataloust. Julk.* 149, 15 pp., 3 figs., 1956. [English summary.]

From the Agricultural Research Centre, Tikkurila, Finland, the author describes and tabulates the results of further experiments performed in 1955 to determine the correct timing of spraying operations in relation to the biology of apple scab (*Venturia inaequalis*) [35, p. 301; cf. 35, p. 899]. As in previous years (notwithstanding very different meteorological conditions) ascospore discharge commenced during the third week in May and finished on 27th June, the number of rainy days in the latter month being 16. The mercurials 0·1 per cent. mercuform (4·2 per cent. phenyl mercury acetate), 0·15 to 0·125 per cent. verdasan (5 per cent. phenyl mercury acetate), and duphar [35, p. 375] at 0·15, 0·08, 0·06, and 0·05 per cent., respectively, for the treatments on 15th and 29th June, 13th July, and 5th August, gave the most effective protection. An increase in the concentration of orthocide 50 [captan] from 0·2 to 0·6 per cent. reduced the incidence of fruit but not of leaf scab.

In a test carried out on the timing of sprays Bayer's mercury spray (1·54 per cent. methoxyethylmercury silicate, 1·28 per cent. phenyl mercury acetate) was successful as an eradicant in combination with the protectant thiram. The main difficulty involved in the use of the spray-timing procedure is the need for exactitude in application and in assessing the dates of the infection period.

WILSON (G. J.). **Glomerella infection in the Auckland district.**—*Orchard. N.Z.*, 29, 9, pp. 27, 29, 31, 1 fig., 1956.

During the 1955–6 season the percentage of fruit rejected by the Apple and Pear Board's Assembly Depot at Henderson, New Zealand, was the highest for many years. *Glomerella cingulata* [35, p. 692], which was present in most orchards, where infection ranged from a few fruits to 50 per cent. in some varieties, particularly Granny Smith apples, was alone responsible for 40 per cent. of the rejected fruit. Weather conditions were ideal for the fungus this season in Auckland where it was first noticed on Gravenstein apples and a little later on Williams' Bon Chrétien pears; on Granny Smith an early infection was observed in the middle of February. Investigations into disease incidence revealed that two sprayings with the summer Bordeaux mixture early in the new year, as recommended by the Horticulture Division, Auckland, gave satisfactory control without any severe infection. The first summer Bordeaux spray should be applied not later than early January and spraying continued until four weeks before harvest. This is particularly important in wet, warm weather.

CORKE (A. T. K.). **Bitter rot of Apples II. Seasonal variations in the development and sporulation of cankers of Gloeosporium spp. inoculated into Apple branches.** —*J. hort. Sci.*, 31, 4, pp. 272–283, 2 pl., 5 graphs, 1956.

The progress of infections resulting from the inoculation of Cox's Orange Pippin shoots at monthly intervals at Long Ashton Research Station, Bristol, with spore suspensions of *Gloeosporium* [*Neofabraea*] *perennans* [35, pp. 685, 901] showed that the ability to invade healthy tissue was greatest in the winter. Cankers initiated then continued to grow until the following autumn, while summer ones were rapidly and permanently isolated by callus. In September growth of cankers was at a minimum and then ceased. There was an increase of sporulation in September.

Acervuli developed on cankers almost throughout the year and viable conidia were collected in rain washings from mid-May to December.

The failure of most inoculations in January and February, taken in conjunction with the finding of Edney [loc. cit.] that spores are almost totally absent at this time, suggests that in England this is perhaps the best time for pruning.

The results of inoculations with *G. album* indicated that it is not parasitic on the wood. Its frequent occurrence on fruit probably results from its ability to live saprophytically [? in wood] at other times.

Miller (P. R.). **Plant disease situation in the United States.**—*F.A.O. Pl. Prot. Bull.*, 4, 9, pp. 136–139, 2 figs., 1956.

D. F. Millikan and W. R. Martin report that in October, 1955, Red Delicious apples from a tree top-worked on Virginia Crab had developed a corky scarring on the fruit skin in the form of a linear pattern of patches extending from the stem to the apex. Sometimes the patches were small and irregular, and sometimes they coalesced into oblong areas one inch long. Occasionally, the scarring affected the whole of one side, completely obscuring the natural skin pigments. Star-shaped radial scarring generally spread from the apex and occasionally from the stem end. Ripening was considerably retarded. Every fruit on two trees in an orchard of 300 was affected in two consecutive years. This fact and the distribution of the symptoms in the fruits and of the affected trees in the orchards indicated that the condition was not due to spray injury. It appeared to be fairly common in part of northern Missouri.

Bain (Joan M.). **A histological study of the development of superficial scald in Granny Smith Apples.**—*J. hort. Sci.*, 31, 4, pp. 234–238, 2 pl., 1956.

At the Division of Food Preservation and Transport, Homebush, New South Wales, the author found that superficial scald in early-picked Granny Smith apples during and after storage for five months at 0° C. [cf. 29, p. 314; 35, pp. 105, 106, 197] was a progressive browning of the cells of the hypodermal tissue, beginning with the outer layers and, as the disorder grew more severe, affecting all the five or six cell layers of this tissue. Epidermal cells do not usually turn brown though groups of them may do so in severe cases. Their shape is unaffected, but in severe scald there is distortion of the cortical cells and collapse of the hypodermal tissue in a radial direction, causing the area to sink. Although the browning occurs in cells rich in chloroplasts it does not appear to be caused by their breakdown. With the exception of a slight increase in the intensity of staining with methylene blue there were no macroscopic tissue changes prior to the appearance of scald.

Chittenden (E.). **Use of molybdenum in Nelson orchards.**—*Orchard. N.Z.*, 29, 7, p. 2, 2 figs., 1956.

Investigations during the past two years on the effect of molybdenum on the growth of fruit trees in Nelson orchards, New Zealand, showed that soil dressings of sodium molybdate (2 lb. per acre) were of some benefit to apple trees. The effect on the lupin cover crop, particularly in one orchard, was, however, outstanding. In these situations lupins are severely damaged by fungi and are, therefore, not often used as a cover crop. In untreated areas nodules present on the roots were badly affected by an [unspecified] root rot fungus, the roots themselves being mostly destroyed, while those treated with molybdenum were much more resistant to fungal attack. Though the fungus was present on the roots it appeared to have no effect on the health and vigour of the plants.

Bošković (M.). **Suzbijanje korenovog raka na voćnim sadnicama.** [Control of root canker on fruit tree seedlings.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1955*, 31, pp. 33–44, 1955. [English summary.]

Trials were carried out at the Regional Institute for Agricultural Researches, Novi Sad, Yugoslavia, on the disinfection of pear tree seedlings heavily infected with *Bacterium* [*Agrobacterium*] *tumefaciens*, and galled at the collar, and also on those lightly infected, with galls only where the roots had been pruned. Dipping for 5 minutes in 1 per cent. ceresan, or for 10 minutes in 0·1 per cent. mercuric chloride or 1 per cent. copper sulphate gave some control, the efficiency of the fungicides being in the order given [cf. 34, p. 134], and although new tumours formed, was of some permanent value in the case of light infection, but not for heavy infection.

In another experiment ether was effective in the destruction of tumours [31, p. 106], but of little practical use, as new tumours formed subsequently. It was also found that if plants were kept for two or more days before replanting after root pruning there was a reduction of infection via artificial wounds in the bark, but not at the pruning cut, and this procedure was thus of little use.

Dye (D. W.). **Blast of Pear.**—*Orchard. N.Z.*, 29, 7, pp. 5, 7, 3 figs., 1956.

Blossom blast (*Pseudomonas syringae*) of pear has been present at Hastings, New Zealand, for several seasons, but was particularly severe in October, 1953, when it affected Winter Nelis and Williams' Bon Chrétien. The results of the 1954–5 control trial at Havelock North have already been noticed [35, p. 282]. In 1955–6 streptomycin (100 p.p.m. applied as before during the blossom period) gave considerable control, increasing the average percentage of spurs setting one fruit or more from 16 (untreated) to 45, and yields from 71·8 to 80 loose pear cases. Three applications of Bordeaux mixture (6–8–100) were ineffective. The reason for the excessive fruit drop (42·8 per cent.) following streptomycin and Bordeaux mixture (45) is not known.

Wade (G. C.). **Brown rot of stone fruit and its control.**—*Tasm. J. Agric.*, 27, 2, pp. 122–125, 1 fig., 1956.

This is a summary of the information available in Tasmania on brown rot (*Sclerotinia fructicola*) of stone fruits [35, p. 352] with particular reference to apricot [33, p. 361]. Spraying experiments in 1955–6 showed that after a pink bud Bordeaux mixture spray the use of thiram at full bloom, petal fall, shuck fall [calyx drop], and as a fortnightly cover spray reduced the percentage of brown rot from 13·8 in the controls to 2·6. Manam, equally effective, may be a suitable alternative for growers sensitive to thiram.

Klindić (Olga) & Buturović (D.). **Neki biljni paraziti u Bosni i Hercegovini.** [Some plant parasites in Bosnia and Hercegovina.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1955*, 31, pp. 79–84, 4 figs., 1955. [German summary.]

Among the diseases observed to be widespread in Bosnia and Hercegovina, Yugoslavia, are *Phomopsis cinerascens* on figs [cf. 35, p. 621] and *Cercospora cerasella* on cherries [16, p. 20], both of which are described.

Novaković (V.). **Radovi na rešavanju problema šarke Šljive u NR Bosni i Hercegovini od 1953–1955 godine.** [Studies on solving the problem of Plum pox in P.R. of Bosnia and Hercegovina from 1953–1955.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1956*, 35, pp. 105–112, 1956. [English summary.]

A survey of the plum orchards in Bosnia and Hercegovina for plum pox disease [35, p. 774] from 1953 to 1955, inclusive, again revealed the presence of the line pattern [plum line pattern virus: 35, p. 199] in many areas but only on a small number of trees.

Capretti (C.). **Conferma sperimentale di una virosi del Susino 'Shiro'.** [Experimental confirmation of a virosis of Shiro Plum.]—*Riv. Ortoflorofruttic. ital.*, 39, 11–12, pp. 548–556, 6 figs., 1955. [Received 1956.]

When buds from the two Shiro plum trees recently reported from Italy to be affected by a leaf chlorosis [35, p. 618] were grafted on to Shiro plum, and on to cherry, myrobalan, and peach seedlings, the symptoms that developed on the leaves were identical with those of peach line-pattern virosis [plum line pattern] virus [see preceding abstract].

Smith (H. C.). **Collar-rot of Apricots, Peaches, and Cherries.**—*Orchard. N.Z.*, 29, 9, pp. 22–23, 25, 3 figs., 1956.

Phytophthora syringae [map 174], not previously recorded in New Zealand, is reported to have been responsible recently for the death of young peach and apricot trees and die-back of the branches. In 1955–6, 75 one-year-old peach and several one-year-old apricot trees and branches of two four-year-old apricot trees were killed in an orchard near Christchurch. In addition, the disease had been found previously on a two-year-old apricot tree at Auckland. Under New Zealand conditions the disease is regarded as a winter one and is restricted to the trunk and the branches.

In inoculation experiments apricots, peaches, and cherries were all susceptible, but plums proved resistant. There was no infection in the glasshouse at 25° C. or with inoculations in February. Since the fungus occurs in all districts the symptoms are described to acquaint farmers with disease. To prevent further outbreaks it is recommended that during winter until leaf emergence the trunk and lower branches should be sprayed with Bordeaux mixture (6–8–100) or copper oxychloride (5–100); nursery trees should not be left lying on the ground during rainy weather in winter; and gumming branches and diseased bark should be cut out and the wound treated with a mixture of copper oxychloride and petroleum jelly (1 oz. to 1 lb.).

Cohoon (D. F.) & Daines (R. H.). **Peach canker (Fusicoccum amygdali) : times and sites of infections.**—*Plant Dis. Reptr*, 40, 4, pp. 304–308, 1 graph, 1956.

Inoculation studies on peach canker (*Fusicoccum amygdali*) [33, p. 305] in the orchard and greenhouse in New Jersey showed that twig infections occur through the scars left by bud scales, stipules, fruits, and leaves, and through the blossoms, but not through attached, diseased leaves. Leaf and fruit infections occur at wounds. New nodal cankers appear throughout the year but are most numerous in the spring and autumn. Resistance to leaf scar infection developed more rapidly at 80° F. than at lower temperatures and the leaf scars of the susceptible Raritan Rose remain susceptible longer than those of the more resistant Sunhigh.

McClung (A. C.) & Clayton (C. N.). **Boron in relation to foliar and fruiting abnormalities of Peach.**—*Plant Dis. Reptr*, 40, 6, pp. 542-548, 4 figs., 1956.

Cases of suspected boron deficiency in peach trees [cf. 35, p. 199] are reported from the Sandhill area of North Carolina. The disorder, characterized by reduced leaf size, greatly shortened internodes, excessive branching, reduced fruit set and yield, and internal necrosis in the fruit, was associated with very low levels of boron in the leaves and twigs analysed. Further investigations are needed for a more definite diagnosis of the disorder.

Foschi (S.). **Il 'Corneo', agente di marciume sulle Pesche.** ['*Coryneum*', agent of Peach blight.]—Reprinted from *Frutticoltura*, 17, 3, 2 pp., 3 figs., 1955.

In the late summer of 1954 the Institute of Pathology of the University of Bologna, Italy, received from the provinces of Ravenna and Forli some peach fruits

on which *Coryneum beijerinckii* [*Clasterosporium carpophilum*: 32, p. 322] had caused slightly depressed, leather-coloured spots, darker at the margins than at the centre and reaching a diameter of more than 1 cm. These unusual symptoms are attributed to the exceptionally rainy summer.

YARWOOD (C. E.). **Mechanical transmission of Peach yellow bud mosaic virus.**—*Plant Dis. Reptr*, 40, 4, p. 299, 1956.

At the Department of Plant Pathology, University of California, Berkeley, five of the eight potted peach trees treated in water at 45° or 50° C. for 60, 90, or 150 seconds prior to inoculation with the peach yellow bud mosaic virus [35, p. 286], by rubbing with sap from infected cowpea, became infected. All the eight non-heated and non-inoculated trees remained free from the disease. This is believed to be the first case of sap transmission of a virus infection to fruit trees.

HOBART (O. F.). **Passage of Cherry virus through Prunus root grafts.**—*Iowa St. Coll. J. Sci.*, 31, 1, pp. 49–54, 2 figs., 1956.

Results of experiments at the Iowa Agricultural Experiment Station on the possible transmission of cherry viruses (necrotic ring spot, yellows, and prune [plum] dwarf) [36, p. 107] from one *Prunus* tree to another in the same row by root grafting showed that it occurred between pairs of *P. mahaleb*, *P. avium*, and *P. americana* seedlings, and also in interspecific root grafts between these, but natural root grafts are too rare to account for much virus spread in the nursery.

MILLIKAN (D. F.). **Stone fruit virus investigations. I. Inoculation studies of the ring spot virus complex in sweet Cherry.**—*Res. Bull. Mo. agric. Exp. Sta.* 582, 23 pp., 5 figs., 1955. [Received October, 1956.]

This bulletin contains a detailed account of studies on [cherry necrotic] ring spot virus [36, p. 107] on sweet cherry carried out between 1950 and 1953 at the University of Missouri Agricultural Experiment Station, Columbia. The main conclusions have already been noticed from another source [34, p. 378].

JUNG (J.). **Sind Narbe und Griffel Eintrittspforten für Pilzinfektionen?** [Are the stigma and style channels of entry for fungal infections?]—*Phytopath. Z.*, 27, 4, pp. 405–426, 14 figs., 1956.

At the Botanical Garden, Munich, Germany, more than 1,500 stigmas of 61 plant species were inoculated with numerous fungi and examined anatomically. In no case was entry to the ovary effected through this route. Even pathogens specialized on certain hosts, e.g., *Monilia cinerea* [*Sclerotinia laxa*] on cherry [cf. 19, p. 479 *et passim*], did not penetrate further than 4 mm. into the style. The effects of *Botrytis cinerea* on *Paeonia* spp., *Primula sinensis*, *Forsythia europaea*, *F. suspensa*, *Gentiana lutea*, and *Antirrhinum majus* were similar to those induced by *S. laxa* and *S. fructigena* on pome and stone fruits. Mycelial production by unspecialized fungi, e.g., *Penicillium notatum*, and other *P.* and *Aspergillus* spp., Mucoraceae, *Rhizopus nigricans* [*R. stolonifer*], and *Cladosporium herbarum* was confined to the exterior of the stigma of the various plants on which they were tested, including *Oenothera* and *Fuchsia* spp.

Stigma secretions provided a uniformly favourable medium for spore germination, no inhibition of growth occurring until the influence of the style tissue began to operate. The styles remained turgescent long after inoculation of the stigmas, while all other parts of the blossom withered. Plum, apple, and pear fruits readily contracted infection when *B. cinerea* and *S.* spp. were introduced through small wounds in the skin, but negative results were obtained in similar tests with unspecialized fungi.

The inhibitory action of the style tissue on fungal development was not influenced

by modifications in temperature, moisture, and light conditions; by the use of plants or blossoms of different ages; or even by severe injury to the stigma and ovary. The substance responsible for the suppression of growth was found to be present at a high concentration in the stigmas and styles, at a somewhat lower one in the ovary, and absent from the pedicels and petals. It is destroyed by exposure to ultra-violet light and heating at 60° C. and is soluble in water, ethyl alcohol, ethyl ether, and chloroform. The extracts which checked fungal progress exerted no influence on pollen-tube growth in five species, but were shown to contain principles inducing pollen germination.

Posnette (A. F.) & Cropley (R.). **Virus diseases of Cherry trees in England II. Growth suppression caused by some viruses.**—*J. hort. Sci.*, 31, 4, pp. 298–302, 1 pl., 1 graph, 1956.

In experiments started at East Malling Research Station in 1952 rooted layers of the widely used cherry rootstock, mazzard clone F12/1, selected for uniform size, were planted 6 ft. apart and inoculated by patch grafting with scions from trees infected by the cherry viruses of rugose mosaic, rusty mottle, tatter leaf (a virulent strain of [peach] necrotic ring spot), rasp leaf or Pfeffinger, necrotic line pattern, and ring mottle from different parts of England [33, p. 611]. Their girths and heights were measured each winter until that of 1955–6, when the trees were cut off at ground level, weighed, and compared with uninoculated trees.

Each of the viruses reduced the growth of the trees to about the same extent in each successive year. As measured by weight ring mottle virus caused a 15 per cent. fall in growth and tatter leaf and rasp leaf a 57 per cent. fall, the others being intermediate. Within the control group the tree weights were noticeably constant, whereas in some of the infected groups, particularly those with tatter leaf and rasp leaf, they were not.

In another trial F12/1 plants were grafted, for the purpose of identification, with what proved to be ring mottle and rusty mottle material. When the 72 plants infected with the former virus and the 99 with the latter were measured two growing seasons (30 months) after inoculation the reduction of growth, as compared with controls, was greater than that with the different isolates of the same virus used in the first trial.

Stace-Smith (R.). **Studies on Rubus virus diseases in British Columbia. III. Separation of components of Raspberry mosaic.**—*Canad. J. Bot.*, 34, 4, pp. 435–442, 1 pl., 1956.

In this further contribution [cf. 35, p. 201] the disease of red raspberries known as severe mosaic in North America and veinbanding in Scotland [35, p. 874], characterized by yellowing of the tissue adjacent to the veins, puckering of the interveinal tissue, and down-curling of the leaf blade, is shown to be caused by a mixture of two viruses, *Rubus* yellow net and black raspberry necrosis. The component viruses have a common vector, *Amphorophora rubi*, they are non-persistent, and are usually transmitted simultaneously, although in single aphid transmission experiments *Rubus* yellow net was transmitted separately in a few instances.

Bolton (A. T.), Fitzpatrick (R. E.), & Mellor (Frances C.). **Common Strawberry diseases and their control.**—*Publ. Dep. Agric. Can.* 982, 9 pp., 6 figs., 1956.

The symptoms of ten of the commonest fungus diseases of strawberry in Canada [cf. 33, p. 468] are described with brief instructions for their control and information on the reaction of varieties. Virus diseases also are discussed and finally there is a short note on non-infectious leaf variegation.

Nelson (P. E.) & Wilhelm (S. L.). **An undescribed fungus causing a root rot of Strawberry.**—*Mycologia*, 48, 4, pp. 547–551, 2 figs., 1956.

A description is given of an imperfect fungus, apparently without the characteristics of any previously described genus, found to be pathogenic to strawberry roots in California. It caused extensive root rot in one field and is believed to have been the primary agent responsible for the failure of the planting. In greenhouse infection experiments it caused black, sunken lesions on and die-back of the large adventitious roots and their branches, and killed numerous feeder rootlets.

The fungus produces on short lateral hyphae dark brown, uni- or multicellular chlamydospores both in culture and in the cortical tissues of affected roots. These are so characteristic as to permit rapid identification of the disease. The non-septate, hyaline conidia measure 10 to 20 by 3 to 4 μ at the widest part; they are lunate, with acuminate tips, and are produced in dry heads on short, distinct, pale brown, non-septate conidiophores, which measure 13 to 33 (mostly 16 to 26) by 3 to 5 μ at the base when mature; they taper towards the tip, usually have a basal swelling, and may occasionally possess a basal septum.

The fungus is distinguished from *Ramularia* by its conidia and differs from *Menispora* (S. J. Hughes, *Canad. J. Bot.*, 31, pp. 577–659, 1953) in the absence of a collarette on the phialide. A new genus is accordingly erected to accommodate the fungus, which is named *Idriella lunata* n.sp.

Waite (B. H.). **Fusarium stalk rot of Bananas in Central America.**—*Plant Dis. Reptr*, 40, 4, pp. 309–311, 4 figs., 1956.

At the United Fruit Company Division of Tropical Research, La Lima, Honduras, *Fusarium moniliforme* [*Gibberella fujikuroi*] was identified as the fungus responsible for the stalk heart rot of banana, abaca (*Musa textilis*), and plantain (*M. paradisiaca*) [17, p. 50; 34, p. 517]. The symptoms were reproduced only when sheaths or furled leaves in the pseudostem were wound-inoculated, the rot spreading readily in the furled laminae and later into the midribs. Soil inoculation gave negative results.

In Central America the disease is particularly prevalent in young banana plantings before the first crop is produced, on wind-damaged plants, and on severely pruned clumps. Incidence is frequently very high in newly planted areas previously flood-fallowed for the eradication of the Panama disease (*F. oxysporum* f. *cubense*) [35, p. 906] but becomes progressively less in older plantings. The fungus is commonly saprophytic on banana debris and occasionally on pseudostems, rhizomes, and roots of plants infected by Panama disease and Moko disease (*Pseudomonas solanacearum*) [33, p. 282]. The spores are probably distributed by wind-driven rain or overhead irrigation. Diseased stalks are pruned regularly and the disease is seldom a problem in commercial plantings.

Castellani (E.). **La biologia del 'Gloeosporium musarum' in rapporto alle condizioni di coltura e di trasporto delle Banane.** [The biology of *Gloeosporium musarum* in relation to the conditions of growth and transport of Bananas.]—*Riv. Agric. subtrop.*, 50, 7–9, pp. 339–356, 3 figs., 1 diag., 3 graphs, 1956.

Much of the information contained in this paper on the biology of *Gloeosporium musarum* and the conditions affecting its incidence on bananas in transit from Somaliland has already been noticed [35, p. 905]. In mid-January, 1955, there was 15 per cent. wastage on arrival in Genoa, followed by 8, 6·95, 8·05, 1·97, and 3·54 per cent. during subsequent voyages. The heavy rainfall during October and November was an important factor in the high wastage among stems cut in January and February.

Parham (B. E. V.). **Outbreaks and new records. Western Samoa.**—*F.A.O. Pl. Prot. Bull.*, 4, 11, p. 172, 1956.

Banana bunchy top virus [map 19] has been positively determined as occurring in Western Samoa, where the aphid vector (*Pentalonia nigronervosa*) is also present. A field campaign for the control of the vector and the eradication of affected plants has been undertaken.

Condit (Ira J.) & Enderud (J.). **A bibliography of the Fig.**—*Hilgardia*, 25, 663 pp., 1956.

This bibliography of the world literature on the fig, arranged under subjects with an authors' index appended, and intended primarily to help librarians, specialists in subtropical horticulture, and persons interested in fig cultivation, includes a large section (pp. 520–562) of references to diseases [28, p. 226].

Gustafson (C. D.). **How to identify Avocado diseases and what to do about them.**—*Leafl. Div. agric. Sci. Univ. Calif.* 61, single-page folder, 9 col. figs., 1956.

This useful folder issued by the Extension Service of the California Agricultural Experiment Station, San Diego, describes the symptoms, causal agents, effects, and recommended methods of control of eight common diseases of avocado pear [cf. 35, p. 907]. The symptoms caused by each are illustrated in colour.

Brown spot of Passion fruit.—*Agric. Gaz. N.S.W.*, 67, 9, pp. 490, 493, 2 figs., 1956.

Most of this information on the symptoms and control of brown spot (*Alternaria passiflorae*) on passion fruit in New South Wales has already been noted [32, p. 668 *et passim*]. A 0·25 per cent. solution of citric, tartaric, or hydrochloric acid removes the Bordeaux mixture spray deposit (1 per cent. for bulk treatment).

Bugiani (A.) & Scrivani (P.). **Messa a punto di un metodo per la riproduzione artificiale della rogna dell'Olivo e risultati dei primi saggi terapeutici a mezzo di sostanze antibiotiche.** [Demonstration of a method for the artificial reproduction of Olive knot disease and results of preliminary therapeutic tests on control by means of antibiotic substances.]—*Ital. agric.*, 92, pp. 361–369, 4 figs., 1 graph, 1955. [French, English, and German summaries.]

In experiments conducted at the Agricultural Experimental Laboratory, Società Montecatini, Florence, well-developed tumours induced on two-year-old Corregiolo olive plants by inoculation with *Pseudomonas savastanoi* [35, p. 622] through holes in the stem were smeared with a paste containing 33·53 per cent. streptomycin. A fortnight later the development of all 14 treated tumours had become arrested, though the untreated were still enlarging. A bibliography of 34 titles is appended.

Jeffers (W. F.). **Fungicide information.**—*Ext. Bull. Univ. Md* 157, 72 pp., 1955.

In this list are included the trade name, active ingredients, description, uses, and manufacturer of all fungicides readily available in Maryland, compiled from literature supplied by the manufacturers. The index includes a list of crops and their diseases with references to the products recommended for control. A list of manufacturers and their addresses is appended.

Frohberger (P. E.). **Untersuchungen über die Wirkung von Chinonoxim-benzoylhydrazon gegen Keimlingskrankheiten verschiedener Kulturpflanzen.** [Studies on the action of quinonoxim-benzoylhydrazone against seedling diseases of various cultivated plants.]—*Phytopath. Z.*, 27, 4, pp. 427–455, 1 graph, 1956.

Mention has already been made of the author's success in combating damping-off pathogens, e.g., *Phoma betae* and *Pythium debaryanum* on beet, by seed treatment

with quinonoxim-benzoylhydrazone [34, p. 662]. This is an expanded, fully tabulated survey and discussion of the same experiments. *P. ultimum* on beet and peas was also controlled by the chemical at a dosage of 2 gm. per kg., but phenyl mercury acetate proved superior in the elimination of *Colletotrichum lindemuthianum* from bean [*Phaseolus vulgaris*] seed. The best control of the latter, as well as of seed-borne infection of beet by *Cercospora beticola*, was accomplished by combined treatment with the two compounds, each at 2 gm. per kg.

The powerful protective effect of quinonoxim-benzoylhydrazone is attributed to the uptake of the active principle by the swelling, germinating seed and its diffusion through the seedling, rather than to direct action on the fungi adhering to the seed.

Hrushovetz (S. B.). **Cytological studies of ascus development in Cochliobolus sativus.**—*Canad. J. Bot.*, 34, 4, pp. 641–651, 3 pl., 1956.

In further studies on *Cochliobolus sativus* at the University of Toronto [35, p. 912] the haploid chromosome number was determined as at least seven, probably eight, in the meiotic and mitotic divisions in the ascus.

Kern (H.). **Welkekrankheiten und Welketoxine bei Pflanzen.** [Wilt diseases and wilt toxins in plants.]—*Umschau*, 56, 18, pp. 548–551, 4 figs., 4 graphs, 1956.

Reference has already been made in this *Review* to the studies on wilt diseases and the associated toxins cited by the author in this up-to-date survey of the available information concerning, e.g., *Endothia parasitica* on chestnut, *Pseudomonas tabacum* on tobacco, and *Fusarium* [*bulbigenum* var.] *lycopersici* on tomato.

Pauli (F.). **Heidenhain's haematoxylin in cytological studies of Penicillium notatum.**—*Stain Technol.*, 31, 2, pp. 91–93, 1 fig., 1956.

In cytological studies at the College of Agriculture, Potchefstroom, Transvaal, South Africa, hyphal nuclei of *Penicillium* were satisfactorily stained with Heidenhain's iron-haematoxylin. Conidia were germinated on a thin film of Czapek-Dox agar on a slide, fixed in Flemming's fluid, and stained at various growth stages. The preparations were differentiated in 4 per cent. iron-alum and could be made permanent by sealing with Canada balsam.

Malan (C. E.). **Una modifica alla tecnica di coltivazione su portaoggetti di Schizomiceti e funghi filamentosi.** [A modification of the technique for growing bacteria and filamentous fungi on slides.]—*Alliona* (*Boll. Ist. Orto bot. Univ. Torino*), 2, 2, pp. 259–267, 2 figs., 1955. [English summary.]

A description is given of a technique facilitating the examination of bacteria and fungi, based on Henrici's method of growing moulds between a slide and a cover-slip [cf. 10, p. 257]. It involves the construction of a simple micro-chamber on a slide.

Kaplan (L.). **A rotary shaking machine for laboratory use.**—*Mycologia*, 48, 4, pp. 609–611, 3 figs., 1956.

A description is given of a simple, home-made rotary shaking machine used in work with submerged cultures at the Department of Botany, Southern Illinois University, Carbondale. It consists of a lower stationary platform, a central movable platform, and an upper movable tray. The central platform moves north and south on the lower stationary platform, while the upper tray moves east and west on the central platform. When a motor-driven eccentric is attached to the tray, the movement of the tray becomes that of the eccentric. The apparatus operates well for long periods with a minimum of attention, and requires little or no servicing.

Dunegan (J. C.) & Wilson (R. A.). **Preliminary note on the downward movement of streptomycin in Apple and Pear tissues.**—*Plant Dis. Reptr*, 40, 6, p. 478, 1956.

Experiments at Beltsville, Maryland, using a modification of a leaf injection method described by W. A. Roach [18, p. 539], showed that streptomycin or some of its by-products can diffuse downward as well as upward (cf. *Phytopathology*, 43, p. 405, 1953) in apple or pear tissues, the movement being best demonstrated in trees with actively growing terminals.

Lorah (Martha E.), Funk (E. M.), & Forward (J.). **Reducing spoilage in shell eggs by the use of fungicides.**—*Res. Bull. Mo. agric. Exp. Sta.* 573, 31 pp., 5 figs., 1954. [Received October, 1956.]

Fungi isolated from stored eggs [cf. 30, p. 239] at the University of Missouri Agricultural Experiment Station, Columbia, included *Penicillium roseo-purpureum*, *P. cyaneum*, *P. flavum*, *P. digitatum*, *P. chrysogenum*, *P. citreoroseum*, *P. citrinum*, *P. brevi-compactum*, *P. commune*, *P. glaucum*, *P. sulphureum*, *Aspergillus niger*, *A. fumigatus*, *A. giganteus*, *A. ochraceus*, *A. glaucus*, *A. nidulans*, *A. oryzae*, *A. clavatus*, *A. flavipes*, *A. terreus*, *Rhizopus nigricans* [*R. stolonifer*], *Mucor spinosus*, *M. pyriformis*, *Cladosporium herbarum*, *Scopulariopsis brevicaulis*, *Sporotrichum* spp., *Trichothecium roseum*, *Oospora lactis*, *Alternaria tenuis*, *Actinomyces ruber*, and *A.* sp. Most were internal.

Fresh eggs were inoculated with *P. cyaneum*, *P. flavum*, *P. citrinum*, *Aspergillus glaucus*, *A. niger*, *R. stolonifer*, *Actinomyces ruber*, and *Alternaria tenuis* by swabbing the surface with nutrient broth washings from cultures and keeping the eggs in wide-mouthed gallon jars at 70° to 75° F. The symptoms produced are described.

Ziram and thiourea proved effective as fungicide dips in aqueous solutions or oil emulsion at concentrations of 1·0 to 0·1 per cent. and 1·0 to 0·25 per cent., respectively. Tetra-ethylthiuram monosulphide was effective at 1 per cent. but less so at 0·5 per cent., while sodium pentachlorophenol was unsatisfactory. Alkyl dimethyl benzyl ammonium chloride in processing oil at 0·1 to 0·01 per cent. and sodium propionate in a 4 per cent. aqueous solution, followed by oil processing, also proved effective.

Lamprecht (F.). **Combating bread mould, especially Trichosporon variabile.**—*Brot. u. Gebäck*, 9, pp. 26–30, 1955. [German. Abs. in *Chem. Abstr.*, 50, 22, col. 17228, 1956.]

At the firm of H. Boehringer Sohn, Ingelheim, Germany, baked slices of rye-bread dough treated with various chemicals were inoculated with *Trichosporon variabile* and either maintained under sterile conditions or exposed to contamination by extraneous [unspecified] moulds prior to incubation at 32° to 33° C. in a humid atmosphere.

A concentration of 0·5 per cent. formic acid or an equivalent amount of its calcium salt inhibited the growth of *T. variabile*, but that of other species was not checked at concentrations of up to 0·75 per cent., which in any case interfere with fermentation and baking properties and impart a harsh flavour. Benzoic acid and sodium benzoate controlled *T. variabile* at levels of 0·5 and 1 per cent., respectively. The concentrations of ethyl-hydroxybenzoate, hexamethylenetetramine, acetic acid, and benzoic acid requisite to prevent the development of *T. variabile* were deleterious either to fermentation or taste. Calcium propionate retarded the growth of most moulds at a strength of 0·5 per cent. and of *T. variabile* at 2. Sorbic acid [see next abstract] at 0·2 per cent. or the equivalent amount of sodium sorbate acted specifically against *T. variabile* but did not entirely inhibit the growth of

other moulds. For the complete control of all species treatment with 0·54 per cent. of a mixture of 44 per cent. sodium sorbate and 56 per cent. calcium propionate is recommended.

EMERSON (D. W.). **More effective mold control provided by sorbic.**—*Canned Food Indust.*, 27, 7, p. 29, 1956. [Abs. in *Chem. Abstr.*, 50, 22, col. 17225, 1956.]

Sorbic acid [34, p. 801 and preceding abstract] was shown by experiments at Union Carbide (Canada) Ltd., Montreal, to be an effective and safe preventive of [unspecified] mould development in cheese (surface treatment, 2·5 to 5 gm. per 1,000 sq. ft.), baked goods (0·1 per cent. of weight of batter), and pickles (0·1 to 0·5 per cent.). It operates most efficiently at pH 4·5 or below, but even at pH 7 proved to be far superior to sodium benzoate or the propionates.

Gibberellins for growth.—*Chem. Engng News*, 34, 38, pp. 4496, 4501, 1956.

Attention is drawn to the vast potentialities of gibberellin in the field of crop improvement. The following are among the results already achieved by Government and industrial research workers in the United States. Treated with gibberellic acid or gibberellin A 3 ($C_{19}H_{22}O_6$) [35, p. 700] ornamentals such as geraniums, sunflowers, and roses have grown from one-half to three times taller than the untreated. Similar applications have doubled or trebled the heights of crop plants, e.g., snap beans [*Phaseolus vulgaris*], peppers [*Capsicum* spp.], and maize, while new growth of forest trees, for example, willow oak [*Quercus phellos*], tulip poplar [*Liriodendron tulipifera*], and maple [*Acer* spp.], was greatly stimulated by treatment with gibberellic acid. The other two forms of gibberellin, A or A_1 ($C_{19}H_{24}O_6$) [loc. cit.] and A_2 ($C_{19}H_{26}O_6$), promise to be equally effective.

Not only linear growth but weight and solid matter may be increased by spraying with gibberellin—from 30 to 40 per cent. in beans and soybeans in preliminary experiments. Until August, 1956, gibberellin was obtainable only at the Northern Utilization Research Branch, Peoria, Illinois, but limited quantities have since been made available free of charge by Eli Lilly and Merck to agricultural stations and other interested parties.

The international history of the growth regulator is briefly outlined and some further possibilities for its use are mentioned.

RANGASWAMI (G.). **A preliminary report on the use of mycothricin complex in plants.**—*Plant Dis. Reptr*, 40, 6, pp. 483–487, 1 fig., 1956.

At the Institute of Microbiology, Rutgers University, New Brunswick, New Jersey, mycothricin complex A, a water-soluble, basic, and thermostable substance related to the streptomycin group of antibiotics, was non-toxic to tomato, cucumber, and wheat seeds at 5,000 p.p.m., to their foliage when sprayed at 2,500 p.p.m., and to tomato and cucumber seedlings in liquid cultures at 500 p.p.m. The antibiotic is systemically transmitted in tomato and cucumber plants and is diffused inside wheat seed. When wheat seeds naturally infected with *Helminthosporium* sp. and other fungi and bacteria were treated with mycothricin complex A, growth of the organisms was completely inhibited and germination increased.

OSTERTAG (H.). **Erläuterungen zu DIN 53930 bis 53933 : Prüfung von Textilien. Bestimmung der Widerstandsfähigkeit zellulosehaltiger Textilien gegen Schädigungen durch Mikroorganismen.** [Elucidations of DIN 53930 to 53933: testing of texiles. Determination of the resistance of cellulosic textiles to damage by micro-organisms.]—*Melliand Textilber.*, 37, 6, pp. 708–710, 1 fig., 1956.

This explanatory article forms an introduction to draft specifications DIN 53930 to 53933, inclusive [reproduced in full on pp. 711–714], describing methods for

determining the resistance of cellulosic textiles to microbiological degradation [cf. 35, p. 114]. One of the principal sources of error (which cannot be eliminated even in the soil burial test) is that non-leaching-fast preservatives by going into solution may inhibit the mycelial growth and spore germination of the test fungi, *Chaetomium globosum*, *Trichoderma viride*, and *Myrothecium verrucaria*.

Ohms (R. E.). **A phycomycetous mycorrhiza on Barley roots in South Dakota.**—*Plant Dis. Reptr*, 40, 6, p. 507, 1956.

During the winter of 1955–6 abundant phycomycetous mycorrhizal infection was found in roots of barley plants growing in the greenhouse at the South Dakota State College Experiment Station, Brookings, in soil from a field designated as a *Pythium* root rot nursery. Spores isolated from the soil were similar to, if not identical with, the A and B spore types [35, p. 625]. C spores [loc. cit.] were also present on and connected to the same hyphae.

Venkata Ram (C. S.). **Detection of growth factors in culture filtrate of Fusaria.**—*Curr. Sci.*, 25, 10, pp. 329–330, 1 pl., 1956.

To test growth factors in *Fusarium* culture filtrates [cf. 32, p. 481] at the University Botany Laboratory, Madras, rice seed, pre-soaked for four hours, was germinated at 27° to 29° C. on a gauze cover sagging into a beaker containing dialyzed culture filtrates of the fungus in 100 ml. of water, the seedling root lengths being measured subsequently.

Analysis of the filtrates and testing of the constituents separately indicated that tyrosine and phenylalanine were the substances responsible for growth stimulation.

Zachariah (Anna T.), Hansen (H. N.), & Snyder (W. C.). **The influence of environmental factors on cultural characters of Fusarium species.**—*Mycologia*, 48, 4, pp. 459–467, 1 fig., 1956.

Single-spore isolates of single clones of eight species of *Fusarium* (new species concept) [25, p. 366] were grown at the Department of Plant Pathology, University of California, Berkeley, on potato-dextrose agar under a series of environmental conditions. The cultures of *F. solani*, *F. oxysporum*, *F.* [*Calonectria*] *rigidiuscula*, and *F. roseum* were markedly zoned when grown in alternating light and darkness or at fluctuating temperatures. *C. rigidiuscula* and *F. roseum* developed a more conspicuous pigmentation in the dark than in the light; in the other species pigment occurred only in the light. Only *F. solani* produced sporodochia or pionnotes in complete darkness at 20° C. (constant). Diurnal fluctuations of light and temperature favoured sporulation, the optima being 12 hours' darkness and 12 of light and 20° to 23° for *F. moniliforme* [*Gibberella fujikuroi*]; 20° to 25° for *F. oxysporum* and *F. solani*; 25° to 30° for *C. rigidiuscula* and *F. episphaeria*; and narrow fluctuations, never exceeding 20°, for *F. roseum*, *F. tricinctum*, and *F. lateritium*. *F. solani* was able to sustain a wider fluctuation in temperature than *F. oxysporum*. *F. tricinctum* and *F. lateritium* failed to sporulate under any conditions provided; it is assumed that these species require as low a temperature as *F. roseum* before sporulation can occur. *F. roseum* readily produced *Gibberella* perithecia; they were abundant in fluctuating light at 20°.

While normal growth and sporulation of several species occurred in outdoor cultures exposed to diurnal conditions at Berkeley during November, conditions were unfavourable in January for most.

Although only one clone of each species was used, all were representative of the clones commonly occurring in nature, and it is suggested that the results obtained may apply in general to recently cultured isolates of these species.

Darby (R. T.) & Mandels (G. R.). **Effects of sporulation medium and age on fungus spore physiology.**—*Plant Physiol.*, 30, 4, pp. 360–366, 8 graphs, 1955. [Received July, 1956.]

At the Pioneering Research Division, Quartermaster Research and Development Centre, Natick, Massachusetts, it was found that spores of *Myrothecium verrucaria* [34, p. 170] from a medium containing cellulose had a greater longevity than those from succinate, peptone, potato dextrose, or sucrose plus yeast extract cultures. The change in dry weight of the spores with age had no correlation with loss of viability. Their nitrogen content varied from 2 to 15 per cent. according to the medium.

While the effects of the substratum on *M. verrucaria* spores were all quantitative, definite qualitative differences were observed in spores of *Memnoniella echinata* and *Aspergillus luchuensis* on different media. The endogenous respiration of spores of these two species was stimulated by basal salts. Depending on the spore source and composition of the suspending medium endogenous respiration in the latter species was either inhibited or stimulated by azide.

Lopatecki (L. E.) & Newton (W.). **The nutrition of Phytophthora.**—*Canad. J. Bot.*, 34, 5, pp. 751–757, 1 graph, 1956.

The nutritional requirements of four species of *Phytophthora* were investigated in joint studies at the Plant Pathology Laboratory, Saanichton, British Columbia, and the Science Service Laboratory, Lethbridge, Alberta. The growth of *P. megasperma* was good with nitrate but not with ammonium nitrogen; the reverse was observed with *P. cactorum*. *P. parasitica* [see next abstract] and *P. erythroseptica* grew well with either nitrogen source but better with nitrate. Organic nitrogen improved the growth of all four. The metals iron, zinc, copper, and manganese were shown to be essential trace elements (zinc more so than iron), and optimal requirement of glucose or sucrose was about 4 per cent. If the level of thiamine was increased from 0·2 to 0·8 mgm. per l. growth rate and sugar consumption also rose, while the percentage of nitrogen in the mycelium decreased.

It is concluded that *P. parasitica* may be employed for the accurate bioassay of thiamine at concentrations of 0·2 to 0·6 mgm per l. when the medium contains 1 per cent. DL-alanine.

Newton (W.). **The nonutilization of *d*-alanine and growth stimulation by *l*-alanine in the nutrition of Phytophthora parasitica.**—*Canad. J. Bot.*, 34, 5, pp. 759–761, 1956.

In nutritional studies at the Plant Pathology Laboratory, Saanichton, British Columbia, growth of *Phytophthora parasitica* was very slight in media with D-alanine as the sole source of nitrogen but was abundant with L-alanine. *Verticillium albo-atrum* was able to utilize D-alanine, although less efficiently than the L form.

Stover (R. H.). **Effect of nutrition on growth and chlamydospore formation in brown and gray cultures of Thielaviopsis basicola.**—*Canad. J. Bot.*, 34, 4, pp. 459–472, 1956.

In a comparative physiological study of the nutritional requirements of the brown and grey wild types of *Thielaviopsis basicola* [30, p. 435] at the Botany Department, University of Toronto, the grey wild type was more thiamine-deficient, yielded less mycelium, and grew more slowly than the brown on all the media tested. Few qualititive differences were found to differentiate the two types in the early stages of colony development. In thiamine-deficient media both strains formed endoconidia; chlamydospores were not formed except in the presence of thiamine. Chlamydospore formation was blocked by asparagine in the brown type

but not in the grey. It is concluded that chlamydospore growth and behaviour are more sensitive indicators of parasitic physiological processes than endoconidial or mycelial characteristics.

Paul (H. L.) & Bode (O.). **Elektronenmikroskopische Untersuchungen über Kartoffelviren. V. Vermessung der Teilchen des Kartoffel-Aucuba-Virus.** [Electron-microscopic studies on Potato viruses. V. Measurement of the particles of the Potato aucuba virus.]—*Phytopath. Z.*, 27, 4, pp. 456–460, 1 fig., 2 graphs, 1956.

Continuing their studies in the current series [36, p. 116], the authors found that three different strains of potato aucuba mosaic virus were composed of flexible particles with a normal length of 586 mμ and a thickness of about 11 mμ.

Gerola (F. M.) & Gilardi (E.). **Variazioni amilasiche durante la germogliazione di tuberi di Patata (var. Majestic) affetti da mosaico.** [Amylase variations during the germination of Potato tubers (Majestic variety) affected by mosaic.] —*Nuovo G. bot. ital.*, N.S., 62, 1–2, pp. 384–387, 1 graph, 1955.

At the Institute of Botany, University of Milan, it was shown that 46 days after planting Majestic tubers amylase activity was much higher in those derived from healthy plants than in those from plants affected by [unspecified] mosaic virus. It appears that the difference is due to the fact that much less amylase is present in virus-affected tubers than in healthy.

That in both sets of tubers in these experiments and those carried out by Marrè (*Atti Accad. Ligure*, 6, pp. 1–15, 1950) under very different environmental conditions, amylase activity should be at a maximum on about the 30th day after planting may indicate that at this time the tuber reaches a critical period in its life-cycle.

Takase (N.) & Takakuwa (M.). **Studies on the resistance to late blight in Potatoes. II. Field infection of interspecific hybrid Potatoes with newly appeared strain of Phytophthora infestans.**—*Jap. J. Breed.*, 6, 1, pp. 1–4, 1956. [Japanese, with English summary.]

A new strain, H_2, of the potato blight fungus (*Phytophthora infestans*) was detected by the inoculation of detached leaves and field plants of 15 *Solanum demissum* hybrids in Japan [35, p. 788].

Zan (K.). **Persistence and movement of Phytophthora infestans in soil.**—Abs. in *Trans. Brit. mycol. Soc.*, 39, 3, p. 385, 1956.

In this paper, which was presented to the Society at a meeting on 7th January, 1956, it is stated that in unsterilized, sieved, air-dried soil inoculated with a sporangial suspension of *Phytophthora infestans* infectivity persisted for nine to ten weeks [cf. 13, p. 592] (as tested by infection of slices of potato tuber) and depended on soil moisture and temperature. The optimum water content was 15 to 20 per cent. saturation. The infectivity of soil inoculated with a zoospore suspension lasted for only two weeks. The balance of evidence is considered to indicate that *P. infestans* persists in soils as sporangia or germ tubes after germination.

Wallin (J. R.) & Polhemus (D. N.). **The growth and development of Phytophthora infestans from Potato tubers in steamed soil.**—*Plant Dis. Reptr*, 40, 6, pp. 534–537, 1956.

At the Horticultural Crops Research Branch, United States Department of Agriculture, Ames, Iowa, four days after planting potato tubers, inoculated 17 days previously with *Phytophthora infestans* and kept at room temperature in five pots containing steamed soil, mycelium and sporangia of the fungus were observed on

the soil surface. After another 48 hours mycelium alone was present, suggesting a means, difficult to detect, whereby the fungus spreads from the tubers to the foliage. After 27 days only 21 per cent. of the blighted tubers had germinated, as opposed to 100 per cent. of the controls. *P. infestans* was not observed on any of the shoots from infected tubers, but relative humidity in the greenhouse was low.

GREENHAM (C. G.) & MÜLLER (K. O.). **Conductance changes and responses in Potato tubers following infection with various strains of Phytophthora and with Pythium.**—*Aust. J. biol. Sci.*, 9, 2, pp. 199–212, 1 diag., 5 graphs, 1956.

In studies at the Division of Plant Industry, Canberra, electrical conductance of potato tuber tissue at high frequency (1 megacycle per sec.) and at low (1 k. cycle per sec.) was used as a quantitative measure of injury following inoculation with certain strains of *Phytophthora infestans* and with *Pythium ultimum*.

The results showed that the high frequency conductance values were similar in healthy and infected tissue, whereas the low frequency values increased with the duration of infection. In one to two days the interaction of a parabiotic strain of *Phytophthora infestans* [28, p. 415] and the potato tuber, in which the host reacts strongly, resulted in injury to the infected site, whereas a 'eusymbiotic' relationship where the host gives a mild reaction, caused no measurable injury. Four days after inoculation damage in the parabiotic combination extended to a distance of at least 4 mm. in advance of the fungus, though in the eusymbiotic there was no measurable injury in newly invaded tissue.

Conductance changes were not suitable for determining the highest degree of clinical resistance where there was rapid retardation of fungal growth.

Conductance measurements on tubers infected by *Pythium ultimum* showed that the organism produced injury some mm. behind the hyphal tips.

The results accord with the view that the reactive resistance of potato to *Phytophthora infestans* depends on the supra-sensitivity of the host plasm to the metabolic activities of the pathogen [cf. 19, p. 490]. They also support the claim that the virulence of *P. infestans* is pre-conditioned by 'tolerance' of the metabolites of the fungus exhibited by the host tissue. A parabiotic (as distinct from a eusymbiotic) strain of *P. infestans* affects not only the colonized area of the potato tuber but also that adjacent to it.

KRANZ (J.). **Alternaria- und Phomafäule der Kartoffelknolle.** [*Alternaria* and *Phoma* rot of the Potato tuber.]—*Mitt. dtsch. LandwGes., Frankfurt*, 70, 52, pp. 1336–1338, 3 figs., 1956.

This is a report from the Phytopathological Institute, University of Bonn, Western Germany, on the detection of *Phoma foveata*, for the first time in the country [map 210], causing dry rot of Bona potato tubers. Attention has already been drawn to the difficulty of differential diagnosis between this form of decay and that induced by *Alternaria solani* on the basis of external symptoms [35, p. 543]. Should the pycnidia of *P. foveata* fail to develop either in the lesions or in a moist chamber at 16° to 20° C., isolation in pure culture is the only sure method of identification.

TANAKA (I.). **Control of the Potato diseases recently found in Japan.**—*Agric. & Hort., Tokyo*, 31, 11, pp. 65–69, 1955. [Japanese.]

Anthracnose (*Colletotrichum atramentarium*) [map 190] has been observed in Japan since 1947, appearing in Hokkaido from the late summer until harvest time in October. Rotation and 'seed' disinfection by 30 minutes' immersion in a 1 in 800 uspulun solution is recommended. Silver scurf (*Spondylocladium atrovirens*) [map 233] is fairly prevalent but economically less important than the foregoing.

Powdery scab (*Spongospora subterranea*) [map 34] was found in Hokkaido in 1954 and should be combated by thorough drainage and rotation.

Wenzl (H.). **Schalennekrosen als Kälteschäden an Kartoffelknollen.** [Necrosis of the skin as cold damage on Potato tubers.]—*PflSchBer.*, 17, 7, pp. 98–111, 4 figs., 6 graphs, 1956.

The author reports that in the severe winter of 1955–6 frost damage to stored potatoes in Austria was considerable [cf. 34, p. 244], leading to losses of 15 or 20 per cent. in Wald, an important producing area. Necroses of the skin were frequent, sometimes associated with damage in the region of the vascular bundles and a wet rot following the death of the tuber. Rotting of the necrotic patches was always associated with *Colletotrichum atramentarium*.

Hildebrand (E. M.). **Research status of Sweetpotato internal cork virosis in 1956.**—*Plant Dis. Reptr*, 40, 4, pp. 289–298, 4 figs., 1956.

Much of the information in this review of the literature (35 titles) on the sweet potato internal cork virus [35, pp. 843, 923] has already been noticed. At Beltsville, Maryland, aphid transmission of the virus was demonstrated from sweet potato to sweet potato and from sweet potato and several morning glory (*Ipomoea*) varieties to Scarlett O'Hara morning glory [*I. bona-nox* × *I. hederacea*].

Hildebrand (E. M.). **Rapid inoculation techniques for mechanical transmission of Sweetpotato internal cork virus.**—*Plant Dis. Reptr*, 40, 6, pp. 527–530, 1 fig., 1956.

This information has already been noticed from another source [35, p. 632]. It is suggested that the effect of the potassium phosphate buffer used is to lubricate, to prevent chemically deleterious action of the host tissue sap on the virus, and to protect the wounds and exposed protoplasm by filming over the leaf surface [cf. 35, p. 843].

Abuniya (D.). **Seedling blight of the Rice plant and its control.**—*Agric. & Hort., Tokyo*, 31, 2, pp. 323–326, 1956. [Japanese.]

During the late nursery-bed stage rice seedlings develop leaf roll and wilt in the course of a day or two. The basal portion becomes watersoaked, turning brown, and the leaves shrivel. This disease occurs when cool weather is quickly followed by warmer conditions. In northern Japan *Pythium* spp. [cf. 30, p. 620] are responsible for a rot of a proportion of young seedlings at a temperature range of 10° to 15° C. Others escape severe infection and make normal growth but tend to develop blight symptoms if cool weather supervenes towards the close of the seed-bed phase. Immersion of the seed for 16 to 18 hours in an organic mercurial, e.g., uspulun at 1 in 1,000, suppresses infection by *Pythium* spp. for a week after sowing, and during the following week attacks may be prevented by incorporation of the chemical in the irrigation water.

Oku (H.). **The effect of pentachlorophenol compounds upon the growth of Cochliobolus miyabeanus.**—*Shokubutsu-Byogai-Kenkyu*, 5, pp. 77–82, 1955. [Abs. in *Chem. Abstr.*, 50, 21, col. 15736, 1956.]

At the Sankyo Company, Tokyo, Japan, the author investigated the effect on the mycelial growth of *Cochliobolus* [*Ophiobolus*] *miyabeanus* [35, p. 712] of various salts of pentachlorophenol, pentachlorophenoxyacetic acid, and calcium, sodium, copper, and mercury pentachlorophenolates.

Sporulation was inhibited by sodium pentachlorophenolate. In a four-hour germination test at 28° C., 0·002 and 0·01 per cent. solutions caused 60 and 100 per

cent. inhibition, respectively. Copper pentachlorophenolate was the most effective of the compounds in the suppression of mycelial growth. The dimensions of conidia grown on maize steep liquor agar containing 0·006 per cent. sodium pentachlorophenolate were smaller than those produced on the same medium without the chemical, but they attained a normal size when cultured on the latter for two generations. The respiration of the mycelium was accelerated by the addition of 0·004 to 0·008 per cent. sodium pentachlorophenolate to a 2·5 per cent. glucose solution at pH 6, but inhibition resulted from the incorporation with the solution of 0·016 per cent. or more of sodium pentachlorophenolate.

Padmanabhan (S. Y.). **Rice diseases in India.**—*News Lett. int. Rice Comm.* 19, pp. 9–15, 1956.

The author reviews the causal agents, symptomology, and control of, and the extent of the damage caused by the following diseases of rice in India: blast (*Piricularia oryzae*) [35, pp. 228, 789], *Cochliobolus* [*Ophiobolus*] *miyabeanus* [35, p. 228], stem rot (*Leptosphaeria salvinii*) [30, p. 405], foot rot (*Gibberella fujikuroi*) [see next abstract], and physiological root rot [36, p. 57].

Andal (R.), Bhuvaneswari (K.), & Subba-Rao (N. S.). **Root exudates of Paddy.**—*Nature, Lond.*, 178, 4541, p. 1063, 1956.

In a new technique used at the University Botany Laboratory, Madras, for the collection of rice root exudates under sterile conditions during the first week of growth, two strains of paddy rice were used, one (GEB. 24) resistant and the other (MTU. 9) susceptible to *Fusarium moniliforme* [*Gibberella fujikuroi*: cf. 34, p. 81 and preceding abstract]. Seedlings germinated under sterile conditions were grown in flasks on filter paper moistened with 1/10 *N* Richards's solution without sucrose. After five days at 30° to 32° C. the plants were removed and the papers ground with 80 per cent. alcohol, the extract centrifuged, and the supernatant concentrated for analysis by ascending chromatography.

The root exudate of GEB. 24 contained cystine [cf. 35, p. 394], asparagine (both in large quantities), tyrosine, and methionine, not present in that of MTU. 9. It is thought that these differences may have a profound effect on the specific rhizosphere microflora.

Gloeosporium leaf disease.—*R.R.I. Plant. Bull.*, N.S., 24, pp. 53–54, 2 figs., 1956.

A brief account is given in popular terms of the symptoms of *Gloeosporium* leaf disease (*G. albo-rubrum*) of *Hevea* rubber [33, p. 257; 34, p. 397], the conditions favouring spread, and control by spraying or dusting with copper fungicides. In Malaya the fungus causes most concern as a disease of young buddings.

Mouldy rot.—*R.R.I. Plant Bull.*, N.S., 25, pp. 67–71, 1 fig., 1956.

This article describing the symptoms, causal organism, prevention, and control of mouldy rot (*Ceratostomella* [*Ceratocystis*] *fimbriata*) of *Hevea* rubber in Malaya, supersedes that of 1953 [34, p. 545]. It includes a new list of approved fungicides.

Reyes V. (M.). **Enfermedades del Jebe producidas por el Phytophthora palmivora.** [Diseases of the Rubber tree caused by *Phytophthora palmivora*.]—*Bol. Exp. agropec., Lima*, 4, 1, pp. 21–25, 1955. [Received November, 1956.]

Preliminary results of field studies at the Tingo María Agricultural Experiment Station, Peru, showed that Peruvian selections of *Hevea* rubber were strongly resistant to diseases such as fruit rot, leaf fall [cf. 34, p. 177], die-back [loc. cit.], black thread [black stripe: cf. 32, p. 508], and canker [cf. 36, p. 58], all caused by *Phytophthora palmivora*.

For control of these diseases a solution of 850 gm. sodium bisulphite and 1 pint commercial formalin in ½ gal. of water is recommended for preventive treatment of the stems. This stock solution, diluted ten times with water, should be used to paint exposed surfaces after tapping.

Wade (G. C.). **The known distribution of trace element deficiencies of plants other than pastures in Tasmania.**—*J. Aust. Inst. agric. Sci.*, 22, 1, pp. 37–39, 1 map, 1956.

Zinc deficiency of fruit trees, especially apples [28, p. 526], occurs in several parts of the Huon, Channel, Bruny Island, Tamar, and Derwent Valley areas of Tasmania. Manganese deficiency [cf. 33, p. 33] appears to be even more widespread. It occurs on apples in the Huon, West Tamar, and Channel districts, and affects apricots and peaches grown on heavy, black soils in the Rokeby, Sandford, Cambridge, and Bagdad areas. On all these trees the symptoms comprise an interveinal chlorosis of the leaves, which may become narrower in the case of affected apples. Good control was given by a post-calyx application of manganese sulphate-carbonate mixture.

Boron deficiency is very widespread and causes serious losses of swedes and turnips, particularly in dry seasons. Corky core of apples, caused by this deficiency, occurs in dry seasons in the Huon and Channel districts and the Tasman peninsula [16, p. 470].

Apple trees at New Norfolk with an orange-yellow discoloration of the bark responded to a copper spray [cf. 34, p. 215].

Iron deficiency occurs on peaches [cf. 28, p. 177] and ornamentals in home gardens in Hobart. The young leaves are affected by a severe chlorosis, but the veins frequently remain green. Molybdenum deficiency has been recorded locally on crucifers [29, p. 5], peas [33, p. 7], and pasture legumes [27, p. 17].

Cases of suspected manganese toxicity in apples [cf. 26, p. 16] and lettuce were observed at Launceston, and the former also at Spreyton.

Chesters (C. G. C.) & Assawah (M. W.). **Koch's postulates applied to the micro-ecology of fungi inhabiting root surfaces.**—*Nature, Lond.*, 178, 4541, pp. 1062–1063, 1956.

As Koch's postulates have apparently not been applied to the micro-ecology of root-surface inhabiting fungi, studies were made at the Department of Botany, University of Nottingham, on the extent to which *Rhizoctonia* [*Corticium*] *solani* isolated from washed roots of *Taraxacum officinale* could colonize plant root surfaces and be recovered. Sterile single pea cotyledons were infected by incubation on actively growing cultures. Three seedlings each of lettuce, onion, pea, tomato, barley, and oats from surface-sterilized seed were grown in tumblers of steamed soil, three tumblers being inoculated with infected pea cotyledons for each species and two not. After three weeks randomly selected pieces of root were washed in sterile water and plated in plain agar. After 22 hours' incubation at 25° C. *C. solani* was recovered from all species, especially from oats and tomato. None was detected on the control roots.

Gorlenko (M. V.). Выживаемость в почве фитопатогенных грибов и бактерий в связи с их происхождением. [Survival in the soil of phytopathogenic fungi and bacteria in connexion with their origin.]—Вест. Московск. Унив. [*Bull. Moscow Univ.*] 9, pp. 95–101, 1955.

The author discusses with reference to the literature (26 titles) the survival of micro-organisms in the soil. The fungi are divided into two main groups: parasites living as typical soil organisms and fungi living indirectly in the soil on plant

debris. Mention is made of the ability of some saprophytic soil fungi and bacteria to become parasitic after growing on plant debris.

Wolniewicz-Czerwińska (Mme K.). **Promieniowce z rodzaju Streptomyces ściółki i gleby lasu Bukowego.** [Actinomycetes of the genus *Streptomyces* from the litter and soil of a Beech wood.]—*Acta Soc. Bot. Polon.*, 25, 1, pp. 111–158, 1 fig., 1 graph, 1956. [English summary.]

A study of the litter and soil samples of a beech wood on the slope of a hill and in a valley stream in Muszkowice, Wrocław district, Poland [see next abstract], revealed that the soils from the hill slope (pH 4 to 6·2) contained more actinomycetes than those in the stream valley (pH 6·6 to 7·2). In general, actinomycetes were more numerous on the litter than in the soil in both places. The development of actinomycetes was at its maximum in the spring and summer. Of the 54 species isolated from both the litter and the soil, 32 per cent. decomposed cellulose, 92 per cent. hydrolysed starch, 72 to 88 per cent. produced proteases, and some 40 per cent. reduced nitrates. This was largely due to the fact that 90 per cent. of the nitrogen in the soil was in the form of protein compounds and the actinomycetes present were particularly specialized in protein decomposition.

Krzemieniewska (H.) & Badura (L.). **Przyczynek do znajomości mikroorganizmów ściółki i gleby lasu Bukowego.** [Contribution to the knowledge of the micro-organisms of the litter and soil of a Beech wood.]—*Acta Soc. Bot. Polon.*, 23, 4, pp. 727–780, 4 pl., 6 figs., 1954.

Descriptions are given of many of the 202 species of fungi, acrasiales, myxomycetes, and myxobacteriales isolated from beech wood litter and soil in the Muszkowice forest, Wrocław, Poland [see preceding abstract], and identified at the University. There are 10 new species (including two of *Botrytis*, both from rabbit dung), one new genus, and one new variety.

Christie (T.). **Black root-rot, Phytophthora cactorum (Leb. and Cohn) Schroet, of the Hop plant.**—*N.Z.J. Sci. Tech.*, Sect. A, 38, 3, pp. 277–284, 1956.

At the Cawthron Institute, Nelson, New Zealand, the hop strain of the black root rot fungus *Phytophthora cactorum* [35, p. 282] grew uniformly between pH 4·7 and 7·4, growth being restricted at pH 8·7 and prevented at pH 3. Field observations and inoculation tests showed that resistance was highest in Fuggle and somewhat lower in Bumford and Golding; Californian was highly susceptible [33, p. 69].

Mei (A.). **Raccolta, tecnologia e cause nemiche del Pepe nell' Asia orientale.** [Harvesting, processing, and pathogens of Pepper in east Asia.]—*Riv. Agric. subtrop.*, 50, 7–9, pp. 396–420, 2 pl., 3 figs., 1956.

On pp. 407–420 the author reviews the literature on diseases of pepper [*Piper nigrum*] in East Asia [cf. 33, p. 630]. Among the fungus diseases discussed are: *Fomes lignosus* [loc. cit.]; *Phytophthora palmivora* var. *piperis* [16, p. 559]; *Sclerotium rolfsii* [23, p. 500]; 'pollu' [19, p. 494]; *Glomerella cingulata* [19, p. 728]; and *Pestalozzia* [*Pestalotia*] *piperis*, which was noted in Ceylon in 1925 but proved unimportant [5, p. 136; cf. 21, p. 504]. *Gloeosporium* and *Diplodia* spp. are often found on lesions caused by *Ticentrus subungulatus*.

Vasudeva (R. S.) & Sahambi (H. S.). **Phyllody in Sesamum (Sesamum orientale L.).**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 124–129, 2 pl., 1956.

Results of studies at the Indian Agricultural Research Institute, New Delhi, on phyllody of sesame [35, p. 279] showed the causal agent to be a virus transmitted by the jassid *Deltocephalus* sp. Various insects were collected from naturally

infected plants in the field and re-fed on sesame, positive transmissions being obtained (on 11 out of 13 plants) only with *D.* sp. Symptoms, which appeared in 33 to 59 days from first feeding, were identical with those on naturally infected plants.

Chattopadhyay (S. B.) & Sen Gupta (S. K.). **A new leaf spot disease of Piper betle in West Bengal.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 105–111, 1 pl., 1956.

At the State Agricultural Research Institute of the Government of West Bengal, Calcutta, the fungus causing a new leaf spot disease of *Piper betle* in the State has been identified as *Fusarium semitectum* [cf. 14, p. 472]. The spots are large (up to 6 cm.), zonate, with chocolate and light brown alternating. The fungus is sometimes associated with other fungi, particularly with *Colletotrichum dasturii* [28, p. 487], and its pathogenicity has been established.

Funaioli (A.). **La Canna da Zucchero e la sua industria nel Natal (Sud Africa).** [The Sugar-Cane and its industry in Natal (South Africa).]—*Riv. Agric. subtrop.*, 50, 7–9, pp. 364–395, 6 figs., 1956.

On pp. 384–387 of this, the second of two articles, the author gives a short account of the sugar-cane diseases in Natal [23, p. 148] caused by viruses, fungi, and bacteria, stating that the incidence of the last-named is unimportant. The following virus diseases are mentioned: mosaic [35, p. 588], particularly serious in the Umzinto area; chlorotic streak [loc. cit.]; streak [29, p. 614], which is now rare, the susceptible Uba variety being little cultivated; and ratoon stunting [35, p. 721]. Fungal pathogens are set out as they affect leaves, inflorescences, culms, or roots.

New chlorotic disease of Sugar Cane.—*News Lett. Indian Inst. Sug. Cane Res.*, 2, 8, pp. 1–2, 1956.

A 'new chlorotic disease' of sugar-cane was recorded in 1955–6 at the Indian Institute of Sugar Cane Research, Lucknow, on the variety Co. 453. The following symptoms occurred, either separately or in combination: stunted, grassy shoots with narrow, chlorotic, yellowish-white leaves; thin stalks, with the leaves of the spindle chlorotic; and premature sprouting of side-shoots, with yellowish-white leaves; these shoots may also occur in canes otherwise appearing healthy.

Vasudeva (R. S.). **Some diseases of Sugar Cane newly found in India.**—*F.A.O. Pl. Prot. Bull.*, 4, 9, pp. 129–131, 1 fig., 1956.

Sugar-cane rust (*Puccinia kuehnii*) [35, p. 791] has become increasingly important in India since the first serious outbreak in 1950 [30, p. 1]. Because of the annual recurrence of the disease the Bombay Department of Agriculture has withdrawn the susceptible variety Co. 475 from general cultivation. Also affected are Co. 876 and Co. 928 in Nellikuppam, Madras, and Co. Nos. 475, 421, 603, 658, and 732, and P.O.J. 2878 in the Hyderabad–Deccan area. In February, 1956, a sudden epidemic was observed in northern India, at Gola Gokarannath, Uttar Pradesh, near the foothills of Nepal, affecting Co. S. 510, which occupies an area of over 5,000 acres. Infection first appeared in the October-planted crop, and spread to the seedlings of the February-planted and ratoon crops.

Co. 419 in the Bombay–Deccan area is affected by a new virus disease, 'grassy shoot'. Numerous thin, small, spindly shoots give the plants a bushy appearance, growth being arrested. The virus is systemic and is perpetuated by the use of infected seed-cuttings. It has also been transmitted by an aphid, probably *Aphis sacchari*. Treatment of cuttings in hot water (50° C. for two hours) gave an appreciable degree of control, but attention should be given to the question of secondary infection.

The presence of ratoon stunting virus disease [35, p. 845] is suspected at Gola Gokarannath and Daurala, western Uttar Pradesh.

VAHEEDUDDIN (S.). **Phytopathological survey of the Hyderabad State.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 166–171, 1956.

This tabulated list of fungi found in Hyderabad in 1938–9 and 1945–6 comprises 14 phycomycetes, 19 ascomycetes, 24 basidiomycetes, and 33 fungi imperfecti, with hosts, common name of the disease, and localities affected.

SUBRAMANIAN (C. V.) & RAMAKRISHNAN (K.). **List of Indian fungi—1952–1956.**—*J. Madras Univ.*, Sect. B, 26, 2, pp. 327–421, 1956.

This continuation of the second supplement to the fungi of India [32, p. 451] contains 765 new records, bringing the total so far, excluding myxomycetes, to 4,445. The bibliography comprises 307 references.

SĂVULESCU (T.) & NEGRU (A.). **Noutăti pentru micoflora R.P.R.** [New species for the fungus flora of the Romanian People's Republic].—*Bul. ști. Acad. Repub. rom.*, 5, 3, pp. 415–423, 1953. [Russian and French summaries. Received October, 1956.]

Twenty additions to the fungus flora of Romania, collected during the past three years, mostly from the Cluj Botanic Garden, include five new species, amongst which are *Sphaerotheca verbenae* on leaves of *Verbena hybrida*, with hyaline ascospores 15 to 25 by 14 to 24 μ; *Microdiplodia zelkovae* on *Zelkova serrata*, with spores 9 to 12 by 4 to 5 μ; *Gloeosporium geranii* on *Geranium macrorrhizum*, with conidia 20 to 26 by 4·5 to 5·5 μ; and *Colletotrichum quercinum* on oak (*Quercus sessiliflora*) [*Q. petraea*], with conidia 14 to 18 by 4·6 to 5·5 μ.

CHADEFAUD (M.). **Sur les asques et la position systématique de l'Ophiobolus graminis Sacc.** [On the asci and the systematic position of *Ophiobolus graminis* Sacc.]—*Bull. Soc. mycol. Fr.*, 71, 4, pp. 325–337, 20 figs., 1955. [Received June, 1956.]

From a detailed study of the apex of the ascus of *Ophiobolus graminis* in comparison with *O. disseminans* Riess (= *O. acuminatus* (Sowerb.) Duby), the species for which the genus was erected, and *O. porphyrogenus*, regarded by Clements and Shear (Genera of Fungi, p. 277, 1954) as the type species, the author concludes that only the ascolocular species with bitunicate asci, no annulus, but an apical 'nasse' of residual cytoplasm surmounting the apical spore should be retained in *Ophiobolus* in the Pleosporaceae; the remainder, including *O. graminis*, previously removed to *Gaeumannomyces* and *Linocarpon* [34, p. 260], are all ascohymienate, with unitunicate asci having a diaporthian, non-amyloid annulus, and should be placed in or near the Gnomoniaceae.

CHONA (B. L.) & MUNJAL (R. L.). **Notes on miscellaneous Indian fungi. II.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 184–198, 3 pl., 1956.

This paper [cf. 32, p. 340], devoted to 10 new species, one new form, new host records, and new records for India, describes a further 20 species, including *Phyllosticta grewiae*, which caused considerable damage to foliage of *Grewia asiatica*, an economically important fruit plant, at New Delhi, and *Attractium indica* n.sp. infesting scale insects on white mulberry at Darjeeling.

YADAV (A. S.) & THIRUMALACHAR (M. J.). **Contribution to the knowledge of Uredineae of Bihar—II.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 143–149, 2 pl., 1956.

This is an annotated list of a further 15 rusts from Bihar, India [cf. 34, p. 65], comprising three new species, new host records, and new records for the district.

Ahmad (S.). **Uredinales of West Pakistan.**—*Biologia, Lahore,* 2, 1, pp. 26–101, 67 figs., 1956.

As a result of this pioneer survey of the Uredinales of West Pakistan 185 species, including five new ones, are listed with descriptions. The species are arranged alphabetically under genera, and a host index and keys to the families and genera are provided.

Locquin (M.). **Petite flore des champignons de France. Tome I. Agarics, Bolets, Clavaires.** [A little flora of the fungi of France. Volume I. Agarics, Boleti, Clavarias.] –377+2 pp., 28 pl., 8 figs., Marcel Locquin, 14 rue de Buffon, Paris, 5e, 1956. Fr. 1,500; (cloth) 1,900.

The primary aim of this book is to facilitate the recognition of edible fungi. A brief introduction noting that over 100 deaths are caused annually in France by *Amanita* [*phalloides*] is followed by sections dealing with fungus poisoning and the cultivation of mushrooms. The greater part of the book is concerned with systematy, giving detailed explanations of the terms used and of the determination of species. The work covers 1,035 different species, and 1,000 figures appear on the 28 plates. Concluding sections describe the culinary value of 100 edible species, and 118 recipes are given.

Korf (R. P.). **Nomenclatural notes. I. Misuse of neotypes for Venturia and Phaeosphaerella.**—*Mycologia,* 48, 4, pp. 591–595, 1956.

The author points out that the use of *Venturia* for the apple and pear scab pathogens (*V. inaequalis* and *V. pirina*) is illegitimate, since the type species of the genus is *V. rosae,* a fungus unrelated to them. A proposal, however, is made for the rejection of *Venturia* de Not. and the conservation of *Venturia* Sacc. with *V. inaequalis* as the type. This suggestion is being referred to the appropriate Committee of the International Botanical Congress.

Emiliani (E.), Falco (F.), & Ricciardi (A. I. A.). **Spontaneous mutation of Aspergillus foenicis (A. niger group), a citric acid producer.**—*Rev. Fac. Ing. quím.,* 24, pp. 27–35, 1955. [Abs. in *Chem. Abstr.,* 50, 21, col. 15698, 1956.]

Two new varieties [unnamed in the abstract] of *Aspergillus foenicis* were isolated from a stock culture maintained for six years. The first differs only in a lack of pigment in the conidia, which are white in young and rust-brown in old colonies instead of black. Citric acid production is the same as in the stock culture. The second variety, arising from the first, yields only half as much citric acid as the stock and tends to form sclerotia rather than conidia, especially on abundant media. Growth, morphology, sugar consumption, and oxalic and citric acid production are compared on liquid and solid media, with and without sodium chloride and malt extract.

Abe (S.). **Studies on the classification of the Penicillia.**—*J. gen. appl. Microbiol.,* 2, 1–2, pp. 1–193, 4 graphs, 1956.

Following a study of five years' duration at the Institute of Applied Microbiology, University of Tokyo, Japan, the author distinguishes 116 species and varieties of *Penicillium* from nearly 2,000 strains isolated from natural sources. The species are re-classified using biochemical as well as morphological criteria, and a key to the genus is presented. Fourteen species, comprising 13 non-ascosporic and one sclerotigenic species, are described as new and 13 new varieties are recognized.

Van Soest (W.) & De Meester-Manger Cats (V.). **Does the aphid Myzus persicae (Sulz.) inbibe Tobacco mosaic virus?**—*Virology*, 2, 3, pp. 411–414, 1 fig., 1 diag., 1956.

As a result of studies at the Institute for Phytopathological Research, Wageningen, Netherlands, on droplets emerging from the cut stylets of feeding aphids, the authors conclude that *Myzus persicae* [29, p. 125] does not inbibe tobacco mosaic virus from tobacco.

Behara (L.), Varzandeh (M.), & Thornberry (H. H.). **Mechanism of the action of abrasives on infection by Tobacco mosaic virus.**—*Virology*, 1, 1–3, pp. 141–151, 2 graphs, 1955. [Received November, 1956.]

In studies at the University of Illinois, Urbana, the number of local lesions caused by tobacco mosaic virus on Scotia bean (*Phaseolus vulgaris*) leaves when the inoculum contained 10 per cent. 600-mesh carborundum powder [cf. 31, p. 474] was greatest when 0·1 *M* phosphate buffer at pH 8·5 was used; without buffer pH 7 was optimum. Infection was higher, however, with 7 per cent. abrasive and buffer. With 10 per cent. abrasive infection increased with decrease in particle size within the range 150 to 800 mesh. Increased infection, induced by 240- and 800-mesh abrasives, was related to the number of abrasive particles in the inoculum. The evidence indicated that the particles do not carry the virus into the tissues, but cause wounds, facilitating infection.

Limasset (P.). **Observations sur les maladies à virus de la Tomate dans le Midi et le Sud-Ouest de la France.** [Observations on virus diseases of Tomato in the south and south-west of France.]—*Progr. agric. vitic.*, 145, 5, pp. 67–72, 1956.

This paper has already been noticed from another source [36, p. 140].

Crossan (D. F.) & Lloyd (P. J.). **The influence of overhead irrigation on the incidence and control of certain Tomato diseases.**—*Plant Dis. Reptr*, 40, 4, pp. 314–317, 1956.

At the Delaware Agricultural Experiment Station the incidence of tomato anthracnose (*Colletotrichum phomoides*) [35, p. 244] and fruit rot primarily due to *Rhizoctonia* [*Corticium*] *solani* [35, p. 2] was considerably higher and that of blossom-end rot [35, p. 795] lower in plots receiving four overhead irrigations, amounting to 4 in. of water, in a 30-day period. Maneb and zineb, both at 2 lb. per 100 gals., in six weekly applications, each of 125 gals. per acre, reduced anthracnose in the irrigated plots from 124 infected fruits to 27 and 67, respectively, and in the non-irrigated from 43 to 2 and 4. Both materials reduced blossom-end rot in non-irrigated plots (from 70 diseased fruits to 38 and 35, respectively) but neither controlled *C. solani*. The results indicate the importance of testing fungicides under irrigation if they are intended for use under such conditions.

Kern (H.). **Der Einfluß des Lycomarasmin-Kupfer-Komplexes auf den Wasserhaushalt abgeschnittener Tomatensprosse.** [The influence of the lycomarasmin-copper complex on the water economy of Tomato cuttings.]—*Phytopath. Z.*, 27, 1, pp. 55–59, 3 graphs, 1956. [English summary.]

The results of further studies on tomato wilt (*Fusarium* [*bulbigenum* var.] *lycopersici*) at the Federal Institute of Technology, Zürich, Switzerland [35, p. 555], demonstrated an essential difference between the effect on the water balance of tomato cuttings of the water-soluble, stable lycomarasmin-copper complex and that of pure lycomarasmin. Thus, in the complex, lycomarasmin is no longer capable of chelating iron in the stem and conveying it into the foliage, and therefore the iron poisoning of the leaves and consequent rise in transpiration induced by pure lycomarasmin do not occur.

Jacks (H.) & Webb (A. J.). **A note on fungicide screening for control of Tomato leaf-mould.**—*N.Z. J. Sci. Tech.*, Sect. A, 38, pp. 342–344, 1956.

Of the 17 fungicides tested on tomatoes in the glasshouse at the Plant Diseases Division, Auckland, New Zealand [cf. 36, p. 139], dichlone (0·5 lb. phygon XL per 100 gals. water), dithane D-14 (nabam-zinc sulphate-hydrated lime 2–1–0·5), captan (2 lb. orthocide), salicylanilide (4 lb. shirlan A.G.), chloranil (1 lb. spergon), and zineb (1 lb. dithane Z-78) were the most effective in controlling leaf mould (*Cladosporium fulvum*) [33, p. 388], the sprays being applied 24 hours before inoculation.

Ceci (D.). **Epifizie di Phoma destructiva Plowr. sul fogliame del Pomodoro.** [Outbreaks of *Phoma destructiva* Plowr. on Tomato foliage.]—*Industr. ital. Cons. aliment.*, 30, 2, pp. 113–115, 5 figs., 1955. [Received 1956.]

Black rot (*Phoma destructiva*) of tomato [33, p. 567] appeared in the province of Parma, Italy, in 1953 and 1954 on leaves of the varieties San Marzano and Ladino di Pannocchia, and in 1954 in the province of Syracuse, Sicily, on San Margano. The disease had previously been noted in Italy only on ripe fruit, whereas in the United States outbreaks on the foliage have already been reported [cf. 17, p. 139].

Røed (H.). **Corynebacterium michiganense (Smith) Jensen on Tomatoes in Norway.**—*Meld. Norg. LandbrHøgsk., 1955–56*, pp. 197–204, 1956. [Norwegian summary.]

An account is given of morphological and cultural studies which confirmed the suspicion that the bacterium causing a wilt of tomatoes in the Oslo Fjord district of Norway, with considerable damage of recent years, particularly in hot summers, is identical with *Corynebacterium michiganense* [cf. 34, p. 81; map 26, and next abstract].

Traaen (A. E.). **Bacteriosis on Tomato plants in Norway.**—*Meld. Norg. Landbr-Høgsk., 1955–56*, pp. 205–210, 1956. [Norwegian summary.]

This is a summary and discussion of investigations carried out by the writer in 1926, and again in 1932, on the tomato wilt in Norway which has now been shown to be caused by *Corynebacterium michiganense* [see preceding abstract]. The severity of the disease was correlated with high summer temperatures, e.g., in both years and also from 1933 to 1935, inclusive. The optimum temperature for the pathogen is about 26° C. [cf. 8, p. 359].

Vaartaja (O.). **Screening fungicides for controlling damping-off of tree seedlings.**—*Phytopathology*, 46, 7, pp. 387–390, 1956.

At the Forest Pathology Laboratory, Saskatoon, Saskatchewan, Canada, the action of 109 chemicals on *Rhizoctonia* [*Corticium*] *solani* and *Pythium debaryanum* was tested with pine (*Pinus banksiana*) [see next abstract] and birch (*Betula verrucosa*) seeds on maize meal agar plates. Most of the compounds were either phytotoxic or ineffectual, but rimocidin (50 to 500 p.p.m.), captan, and tersan (both at 50 to 5,000) [35, pp. 407, 856] controlled damping-off without apparent damage to the plants. A further 19 preparations gave satisfactory results at narrower concentration ranges, while 13, including Bordeaux mixture (50,500), boric acid (500), quinosol (50), dodecyl sodium sulphate (500), and gladiolic acid (50), were effective against *Pythium debaryanum* but failed to eliminate *C. solani*.

Vaartaja (O.) & Cram (W. H.). **Damping-off pathogens of conifers and of Caragana in Saskatchewan.**—*Phytopathology*, 46, 7, pp. 391–397, 1956.

Diseased seedlings from Saskatchewan forest nurseries yielded numerous fungi [34, p. 688] in pure culture, the most frequent being *Fusarium oxysporum*, *F. acuminatum*, *F. solani*, and other *F.* spp., *Pythium ultimum*, *P. debaryanum*,

Rhizoctonia [*Corticium*] *solani*, *Alternaria tenuis* and other *A.* spp., *Phoma glomerata* [loc. cit.], and *Cylindrocarpon* spp. Inoculated into pine (*Pinus banksiana*) and *Caragana arborescens* seedlings [34, p. 180] the *Pythium* spp. and *Corticium solani* were lethal in a few days, while other species were less pathogenic. In greenhouse tests *C. solani* reduced the average emergence of *Caragana arborescens* from 95 to 50 per cent. and Scots pine (*Pinus sylvestris*) from 99 to 73, post-emergence losses being 68 and 64 per cent., respectively. *Corticium solani* did not impair emergence of any of the spruces tested but caused significant post-emergence losses of *Picea glauca* and *P. pungens* (in one of the two progenies tested of each species). *Pythium* (?) *debaryanum* was slightly pathogenic to all the tree seedlings and caused significant reductions in the germination of one *Picea glauca* progeny. *F.o.* var. *redolens* appeared to be responsible for mild symptoms on the same species.

F. spp. were commonly isolated from the roots of surviving, apparently healthy seedlings. Their admixture with *C. solani* reduced the pathogenicity of the latter in inoculation tests.

Příhoda (A.). **Padání semenáčků a hynutí sazenic hnilobou kořenů.** [Damping-off of seedlings and root rot of cuttings.]—*Lesn. Knihovna*, M.Ř., 42, 106 pp., 59 figs., 3 diags., 1954. [Received 1956.]

Significant losses from seedling damping-off and root rot of cuttings occur every year in tree nurseries and sometimes in the field in Czechoslovakia. This booklet, intended to acquaint people with the diseases concerned and thus help in their control, is divided into a systematic section (pp. 10–70), describing the fungi encountered (with numerous illustrations), and sections on control and protection. A bibliography of 52 titles (foreign and Czech) is appended.

Příhoda (A.). **Houby a bakterie poškozující dřevo.** [Fungi and bacteria harmful to trees.]—*Lesn. Knihovna*, M.Ř., 26, 268 pp., 196 figs., 1953. [Received 1956.]

This book on fungi and bacteria attacking forest trees and wood in Czechoslovakia is plentifully illustrated. Changes caused in wood by these organisms are described. The role of wood-rotting fungi in the forest, such as destruction of stumps; the chief kinds of rot, with identification keys; mutual relationships between the fungi; and means of protecting poles, processed wood, and wood products against fungi are all included. Indexes of Czech and Latin names are appended, together with a comprehensive list of references (mostly Czech, Russian, and German).

Le Dothichiza du Peuplier. [The *Dothichiza* of Poplar.]—*Bull. Soc. for. Belg.*, 63, 7, pp. 330–340, 9 figs., 1956.

In this notice, drawn up by the National Belgian Committee of F.A.O. (National Commission on the Poplar) in collaboration with other official bodies in Belgium, a brief account is given in popular terms of the symptoms and control (by improved sanitary and cultural methods and spraying with Bordeaux mixture) of poplar canker (*Dothichiza populea*) [cf. 36, p. 143 *et passim*].

Creelman (D. W.). **Spot anthracnose of Linden.**—*Mycologia*, 48, 4, pp. 552–557, 1 fig., 1956.

In 1954 a destructive leaf-spotting disease occurred on old lime trees (*Tilia europea* and *T. platyphyllos*) at Lunenburg, Nova Scotia. In 1955 the disease was again prevalent there and was also found at Bridgetown on eight *T. europaea* trees, imported from Holland in 1946, and in a nursery at Annapolis Royal on young *T. europaea* trees imported from Tennessee in 1955. No species of *Tilia* is native to Nova Scotia, and the three outbreaks are believed to represent three separate introductions of the disease, which occurs on *T. europaea* in Argentina and on *T. neglecta* in Virginia.

The leaf spots, mostly on the veins and adjacent tissue, are at first black and very small, but they gradually enlarge to 0·5 to 1 mm. in diameter. The centres turn pale grey and eventually fall out. On the petioles, green twigs, and larger veins the lesions are elongate and concave, with a raised black border. On woody tissue they coalesce readily and form lesions up to 10 by 2 to 3 mm. The centres later drop out.

The spots bore acervuli of an undescribed species of *Elsinoe*, the ovate conidia of which measured 3·7 to 6·5 by 1·8 to 2·5 (average 4·7 by 2) μ, the asci 19 to 25 (to 28) by 17 to 20 (to 23) μ, and the triseptate to muriform ascospores 11 to 16 by (4·5 to) 5 to 6 (to 7) μ. The fungus is named *E. tiliae* n.sp.

Creelman (D. W.). **The occurrence of Ash rust in western Nova Scotia.**—*Plant Dis. Reptr*, 40, 6, p. 580, 1956.

This is a short account of the occurrence of ash rust (*Puccinia sparganioides*) [formerly *P. peridermiospora*: 34, p. 680; 36, p. 69] in the western counties of Nova Scotia, where it has been increasingly prevalent since 1951.

Mańka (K.). **Dalsze badania nad przebiegiem holenderskiej chloroby Wiązow (Ceratostomella ulmi (Schw.) Buisman) na terenie m. Poznania (w latach 1946–1953).** [Further studies on the progress of Dutch Elm disease (*Ceratostomella ulmi* (Schw.) Buisman) in the province of Poznań (in 1946–1953).]—*Acta Soc. Bot. Polon.*, 23, 4, pp. 783–805, 14 graphs, 1954. [German summary.]

Part of these investigations on Dutch elm disease (*Ceratostomella ulmi*) in the Poznań province of Poland has already been noticed [34, p. 327]. The present paper deals with laboratory and field studies on the distribution and development of the disease during the period from 1946 to 1953, inclusive. In 1,198 trees examined during that period, 80 per cent. of the deaths recorded were due to *C. ulmi*, the epiphytotic of which was at its highest from 1947 to 1949. Since then the severity of the disease has declined, first in *Ulmus laevis*, then in *U. campestris*, and lastly in *U. scabra*.

Miller (P. W.) & Roth (L. F.). **Relative susceptibility of potted seedlings of Juglans regia, J. hindsii and Pterocarya stenoptera to Phytophthora cinnamomi.**—*Plant Dis. Reptr*, 40, 6, pp. 538–541, 3 figs., 1956.

Joint experiments, carried out by the Agricultural Research Service, United States Department of Agriculture, and the Department of Botany and Plant Pathology, Oregon Agricultural Experiment Station, in which potted two- to three-year-old seedlings of *Juglans regia*, *J. hindsii*, and *Pterocarya stenoptera* were inoculated with *Phytophthora cinnamomi* [cf. 33, p. 439] by pouring pea broth cultures of the fungus into holes 4 in. deep on opposite sides of the plant, showed *P. stenoptera* to be highly resistant to the five strains of the fungus used, the other two species being susceptible.

Biraghi (A.). **Il 'cancro della corteccia' ed i suoi riflessi sulla crisi del Castagno.** ['Bark canker' and its repercussions on the Chestnut crisis.]—Reprinted from *Ital. for. mont.*, 10, 2, 11 pp., 3 figs., 1955. [French summary.]

After recapitulating the results obtained in 19 years' investigations of bark canker of chestnut trees in Italy, caused by *Endothia parasitica* [35, pp. 247, 748, *et passim*], describing the present state of the chestnut plantations, and discussing their future, the author expresses the view that trees will gradually be eliminated by the disease. For coppices the outlook is more reassuring, as these display a strong defensive reaction to attack. Coppices should be renewed at frequent intervals. The paper concludes with a brief discussion of various technical and administrative measures to ameliorate the condition of plantings.

Tokushige (Y.). **On the amylase and the peroxidase of Paulownia affected by witches' broom. On the catalase of Paulownia affected by witches' broom. On the chlorophyll and photosynthesis of Paulownia affected by witches' broom. On the accumulation of soluble sugars in the leaves of Paulownia tree affected by witches' broom. On the inhibition of translocation of starch in Paulownia leaves affected by witches' broom. On the decrease of starch synthesis from sugar solution in the leaves of the Paulownia tree affected by witches' broom. On the inhibition of translocation of carbohydrate in Paulownia tree affected by witches' broom. On the decrease of carbohydrate and nitrogen content of shoots of Paulownia tree affected by witches' broom.**—*Sci. Bull. Fac. Agric. Kyushu*, 15, 3, pp. 287–290; 291–296, 1 graph; 297–302; 303–307; 309–312; 313–318, 1 fig.; 319–326; 327–331, 1 fig., 1955. [Japanese, with English summaries. Received August, 1956.]

In further studies at the Laboratory of Plant Pathology, Kyushu University, on witches' broom virus of *Paulownia tomentosa* [see above, p. 146 and next abstract] affected trees were compared with healthy ones and the following disorders noted: a decrease in amylase and catalase and an increase in peroxidase activity; reduced photosynthesis; inhibition of starch translocation from the leaves and decrease in starch synthesis therein; and decrease in the carbohydrate and nitrogen content of the shoots. It was concluded that the disease was in part due to starvation of the shoots owing to the above causes and in part to an increase in respiration [loc. cit.].

Tokushige (Y.). **On the excess accumulation of chlorogenic acid in Paulownia leaves affected by witches' broom.**—*Proc. Ass. Pl. Prot. Kyushu*, 1, pp. 32–35, 1955. [Japanese, with English summary. Received August, 1956.]

Chromatographic comparison of the polyphenolic substances in healthy and diseased leaves of *Paulownia tomentosa* with witches' broom [see preceding abstract] revealed that chlorogenic acid formed the bulk in both, but was about three times more prevalent in the diseased. This probably accounts for the dark brown discoloration of the sap.

Nohara (Y.) & Zinno (Y.). **Experiments on the control of damping-off of conifer seedlings with special reference to the effect of soil treatment with pyroligneous acid.**—*J. Jap. For. Soc.*, 36, 2, pp. 31–37, 2 pl., 1 graph, 1954. [Japanese, with English summary. Received December, 1956.]

In studies on the control of damping-off of conifer seedlings in Japanese nurseries [cf. 34, p. 412; 36, p. 74] pyroligneous acid, applied to the soil seven to ten days before sowing in sufficient amount to reduce the pH to 5, gave better results than sulphuric acid [35, p. 730] or uspulun, the effect being improved by additional spraying with uspulun when the disease appeared.

Chiba (S.). **Selection of resistant stocks to the needle blight of Cryptomeria japonica.**—*J. Jap. For. Soc.*, 37, 11, pp. 510–512, 1955. [Japanese, with English summary. Abs. in *Biol. Abstr.*, 30, 11, p. 3283, 1956.]

Nursery plants of *Cryptomeria japonica*, apparently resistant to needle blight (*Cercospora cryptomeriae*) [35, p. 133], were selected from a naturally infected site in Japan. In tests for resistance one-year-old seedlings, which when transplanted gave severely infected stocks, and plants in nursery seed-beds were used. The proportion of resistant stocks was very low (0·6 per cent. healthy and 1·4 to 2 per cent. slightly damaged).

Campbell (W. A.) & Copeland (C. L.). **Littleleaf disease of Shortleaf and Loblolly Pines.**—*Circ. U.S. Dep. Agric.* 940, 41 pp., 6 figs., 4 graphs, 2 maps, 1954. [Received September, 1956.]

This well-documented survey of the history, symptoms, distribution, economic importance, causal agents, and control of littleleaf disease of shortleaf and loblolly pines (*Pinus echinata* [34, p. 196] and *P. taeda*) supersedes circular 716 of 1945. There is a full discussion of soil conditions in relation to *Phytophthora cinnamomi* [loc. cit.; 35, pp. 648, 731] and nitrogen deficiency [28, p. 147]. Long-range control by selective breeding and silviculture is discussed.

Childs (T. W.). **Needle blight of Ponderosa Pine.**—*Res. Note Pacif. Nthwest For. Exp. Sta.* 114, 6 pp., 3 figs., 1955. [Mimeographed. Received November, 1956.]

This is a progress report on needle blight (*Elytroderma deformans*) [34, p. 329] on ponderosa pine [*Pinus ponderosa*] in central and eastern Oregon, observed since 1945, at present the most severe attack since 1913. The pathogen is widespread in western North America from California to British Columbia and east to Colorado. In the early stages outbreaks are more severe in damp situations. Infected needles are conspicuously red in spring and early summer, fading to the colour of dead needles in the autumn. The narrow, black fruiting bodies of *E. deformans* appear on the convex surface of the needles in June; the spores ripen and are dispersed in the autumn. Infected needles are killed in the first year; in severe epiphytotics all the trees on several hundred acres may die within a few years. Pine beetles multiply more rapidly on trees weakened by blight and contribute to the losses.

Control recommendations include thinning out overcrowded stands and judicious salvaging in blighted areas.

Hawksworth (F. G.). **Note on the susceptibility of Indian Paintbrush to Cronartium filamentosum.**—*Plant Dis. Reptr*, 40, 6, pp. 581–582, 1956.

In Arizona in 1952 a *Cronartium* sp. on *Castilleja linearifolia* was found in association with *Cronartium filamentosum* on ponderosa pines (*Pinus ponderosa*) [32, p. 651]. In 1955 at the Division of Forest Disease Research, Albuquerque, New Mexico, Indian paintbrush (*Castilleja austromontana*) inoculated with aecidiospores from pine produced uredosori and teleutosori. This suggests that *C.* spp. are alternate hosts of the pine rust.

Thirty-Sixth Annual Report of the Forestry Commissioners for the year ended 30th September 1955.—London, H.M. Stationery Office, 90 pp., 4 pl., 7 maps, 1956.

In the section of this report [cf. 30, p. 552] dealing with forest pathology (p. 54) it is noted that *Lophodermium pinastri* appeared on pines in Britain [35, p. 556] at the end of March, and unusually heavy damage to *Thuja* in nurseries was caused by *Keithia* [*Didymascella*] *thujina* [35, p. 644]. Group dying of Sitka spruce [*Picea sitchensis*] associated with *Rhizina inflata* [33, p. 457] is still under investigation.

Pottier-Alapetite (G.). **A propos d'un balai de sorcière.** [Concerning a witches' broom.]—*Bull. Soc. Sci. nat. Tunis*, 8 (*1954–1955*), 3–4, pp. 189–190, 1 pl., 1956.

The symptoms and life-history of *Melampsorella* (?) *elatina* [*M.* ? *caryophyllacearum*: 34, p. 116], found recently producing an enormous witches' broom on an Aleppo pine in Tunis, are briefly described. The usual host of the rust is *Abies pectinata* [*A. alba*], and the writer also found it two years earlier on *Callitris quadrivalvis*.

Jørgensen (E.). **Fomes annosus (Fr.) Cke on Red Pine in Ontario.**—*For. Chron.*, 32, 1, pp. 86–88, 1 pl., 1956.

The information in this paper has been noticed from another source [36, p. 70].

Nissen (T. V.). **Soil actinomycetes antagonistic to Polyporus annosus Fr.**—*Friesia*, 5, 3–5, pp. 332–339, 2 figs., 1956.

This is an expanded account and discussion of experiments demonstrating the antagonism of actinomycetes (18 in all) isolated from Danish forest soils to *Polyporus* [*Fomes*] *annosus* [35, p. 732], eight of which inhibited the development of the pathogen on potato glucose agar.

Populer (C.). **La pourriture rouge du cœur des résineux (Fomes annosus (Fr.) Cooke).** [Red heart rot of resinous trees (*Fomes annosus* (Fr.) Cooke).]—*Bull. Soc. for. Belg.*, 63, 7, pp. 297–329, 1 pl., 2 diags., 2 graphs, 3 maps, 1956.

In the first part of this paper the author recapitulates, with 26 references to the literature, the present state of knowledge concerning red heart rot (*Fomes annosus*) of conifers [cf. 31, p. 640; 35, p. 800, *et passim*]. In the second part the regional distribution of the disease on spruce in the Belgian Ardennes is given. A survey of 21 areas, comprising 63,000 ha., indicated that there are two districts, geographically and ecologically distinct, one at present unaffected, while in the other the disease is present and spreading. Only trees over 35 years of age were examined, infection seldom being present in younger ones.

In the 'unaffected' region, a plateau of 55,000 ha. over 500 m. above sea-level, on the northern slopes of the Ardennes, only 1 to 2 per cent. of the trees examined were affected (all over 50 years of age), or only 0·98 per cent. of the whole area, in which the [mean] annual atmospheric temperature is under 6·5° [C.], and the annual rainfall is over 1,250 mm. (the summer rainfall being over 300 mm.).

The affected area covers the middle Ardennes (the region of Spa) and all the southern part, together with the region of St. Vith and the plateau of La Haie des Allemands (over 550 m.). Incidence here is rather high; in the middle Ardennes, for example, 1,013 ha. or 92·25 per cent. of the whole area was affected, incidence in the plantings ranging from a few trees to 100 per cent. In this region the mean annual temperature is over 6·5° and the summer rainfall is under 300 mm., though the annual rainfall may reach 1,300 mm.

In the third part of the paper the results of the surveys are tabulated and expressed graphically.

Domański (S.) & Dzięciołowski (W.). **Zgnilizny odziomkowe Sosny zwyczajnej i ich warunki rozwojowe. Część II. Wpływ warunków glebowych w leśnictwie Dobrygość (nadleśnictwo Rychtal).** [Butt rots of the common Pine and the conditions of their development. Part II. Influence of soil conditions in the forest district Dobrygość (forests of Rychtal).]—*Acta Soc. Bot. Polon.*, 24, 1, pp. 65–93, 5 figs., 4 diags., 3 graphs, 1955. [English summary.]

In these further studies of butt rot of Scots pine in Poland [32, p. 44; 35, p. 134] *Polyporus circinatus* was the fungus most commonly associated with the disease, which was most serious on dry, gravelly soil, less prevalent on clay, and least where sandy soil overlying loam favoured optimum root development.

In the 670 trees examined 23·5 per cent. had butt rot, mostly in the heartwood. Three types of rot were to be found, viz., brown, brown with black and blue spots or black islands of decayed wood, and black spots with cracking. The following fungi were isolated from the first: *P. circinatus* (from 110 trees), *P. circinatus* and *Torula* sp. (1), *Sparassis crispa* (2), *P. schweinitzii* and *Haplographium* sp. (1), *Trametes* [*Fomes*] *pini* (7), *Corticium* sp. (1), and unidentified fungi (2). From the

second type of rot were isolated *P. circinatus* (7), *S. crispa* (1), and several species of Dematiaceae and Mucedinaceae, which grew in the heartwood already affected by *P. circinatus* and *S. crispa*, producing blue or black stains. In the third type of rot the spots were similar in structure to those caused by *P. circinatus* but only species of Dematiaceae and Mucedinaceae were isolated.

ETHERIDGE (D. E.). **Decay in subalpine Spruce on the Rocky Mountain Forest Reserve in Alberta.**—*Canad. J. Bot.*, 34, 5, pp. 805–816, 3 pl., 3 graphs, 1 map, 1956.

Most of this information on surveys for decay in living spruce (*Picea glauca*, *P. g.* var. *albertiana*, *P. mariana*, and *P. engelmannii*) in Alberta has already been noticed [34, p. 195]. The trunk rot fungus temporarily designated 'unknown M' has now been assigned to *Peniophora septentrionalis* [35, p. 498].

CHILDS (T. W.). **Synopsis of present information concerning Poria weirii root rot in Douglas Fir.**—*Res. Note Pacif. Nthwest For. Exp. Sta.* 116, 2 pp., 1955. [Mimeographed. Received November, 1956.]

Information on the root rot of Douglas fir [*Pseudotsuga taxifolia*] caused by *Poria weirii* [35, p. 854] is summarized for the use of forest managers in western Washington and Oregon.

The disease is most destructive in 70- to 150-year-old stands and results in the death of most or all the trees in patches surrounding the foci of infection. The rate of damage in each patch doubles in 10 to 20 years and the pathogen may persist in dead roots for more than a century, constituting a perpetual source of danger to any newly planted trees.

Control measures recommended include the planting of less susceptible conifers and judicious cutting in infected stands.

Temperatures necessary to kill fungi in wood.—*Tech. Notes For. Prod. Lab. Wis.* 259, 3 pp., 1956.

This paper recapitulates information which has been noticed from other sources [17, p. 4; 19, p. 56].

TICHÝ (V.). **Biologická impregnace dřeva jako metoda jeho ochrany proti účinkům dřevokazných hub.** [Biological impregnation of wood as a method for its protection against the activity of wood-destroying fungi.]—*Publ. Fac. Sci. Univ. Masaryk*, Ser. 10, 350, 13 pp., 1953. [Russian and German summaries. Received 1956.]

At the Institute of Plant Physiology, Masaryk University, Brno, Czechoslovakia, an investigation was made of the effect of vacuum impregnation with *Bacillus asterosporus*, followed by sterilization, on the intensity of decay (for four months at 25° C.) of pine wood blocks by *Coniophora cerebella* [*C. puteana*], *Poria vaillantii*, *Gloeophyllum saepiarium* [*Lenzites saepiaria*], and *Polyporellus* [*Polyporus*] *squamosus*. The decrease of dry weight caused by these fungi was reduced on the average from between 35 and 55 per cent. to between 1·5 and 5·5 per cent. In one experiment temperatures of −5° to 80° C. did not reduce the effect of impregnation. Similarly, it was not altered by a change in different external conditions, natural or artificial, as long as the blocks remained moist. Constant dry air or in some cases a moist, warm environment could reduce the effect of impregnation, the latter only temporarily, for in the final phase there was an increase in activity, restoring it to its original level. Washing with running water did not cause lixiviation. Embedding the blocks in humus reduced the protective effect of *B. asterosporus*.

Tichý (V.) & Rypáček (V.). **I. O antibiotickém vlivu lišejníku Parmelia physodes (L.)Ach. na růst některých dřevokazných hub. II. O fungistatickém účinku lišejníkových kyselin druhu Parmelia physodes (L.)Ach.** [I. The antibiotic effect of the lichen *Parmelia physodes* (L.)Ach. on the growth of some wood-destroying fungi. II. The fungistatic effect of the lichen acids of the species *Parmelia physodes* (L.)Ach.]—*Publ. Fac. Sci. Univ. Masaryk*, Ser. K7, 335, pp. 71–82, 5 graphs; pp. 83–95, 4 graphs, 1952. [Russian and English summaries. Received 1956.]

In studies at the Institute of Plant Physiology, Masaryk University, Brno, Czechoslovakia, the powdered thallus of *Parmelia physodes* [cf. next abstract] had an antibiotic effect on the following wood-destroying fungi on malt agar: *Merulius lacrymans*, *Schizophyllum commune*, *Fomes marginatus*, and *F. annosus* [cf. 36, p. 49]. The stimulatory action of a small quantity of thallus changed to an inhibitory and finally to a lethal effect as the amount was increased.

Physodic and physodalic acid were extracted from the lichen, together with atranorin and amorphous lichen acids. Physodalic acid and atranorin were not fungistatic to *Fomes annosus* in malt agar, physodic acid was not lethal to it below 0·5 per cent., but the amorphous lichen acids were so at 0·125 per cent.

Tichý (V.). **O fungistatických vlastnostech lišejníku Parmelia furfuracea (L.)Ach.** [On the fungistatic properties of the lichen *Parmelia furfuracea* (L.)Ach.]—*Sborn. přír. Společ. Mor. Ostravé*, 24, 3–4, pp. 368–381, 6 graphs, 1953. [Russian and French summaries. Received 1956.]

Further studies at the Masaryk University [cf. preceding abstract] showed *Parmelia furfuracea* to be fungistatic to *Poria vaillantii*, *Schizophyllum commune*, *Gloeophyllum saepiarium* [*Lenzites saepiaria*], *Fomes marginatus* [see next abstract], and *F. annosus*. It was lethal to the different fungi when pulverized and added to malt agar in amounts ranging from 0·3 and 1·2 per cent.

Rypáček (V.), Tichý (V.), & Hejtmánek (M.). **Teplotní poměry v trouchnivějícím dřevě na přirozeném stanovišti.** [Temperature relations in rotting wood in natural habitats.]—*Acta Acad. Sci. nat. Morav.*, 23, 21, pp. 435–450, 2 figs., 1 diag., 6 graphs, 1951. [English and Russian summaries. Received 1956.]

Fomes marginatus [36, p. 49] was found in 1950 to be responsible for the decay of pine stumps in the forest habitat of the Jeseniky mountains in Czechoslovakia. Temperature measurements in standing stumps in July showed that the activity of the fungus in the wood created a thermostatic condition, the more clearly defined as its growth increased. The temperature of the wood remains within certain limits, in contrast to that of healthy wood, in which it varies considerably with changing air temperatures. A notably high moisture content was maintained in the decayed wood.

Moglia (P. J.). **Portable plant for fence post preservation : low pressure soaking.**—*Timb. Tech.*, 64, 224, pp. 301–302, 3 figs., 1 diag., 1956.

The method of timber preservation favoured by the Division of Forest Products, Melbourne, Australia, for general small-scale use is cold soaking for periods of up to one week in creosote oil by a newly developed low-pressure process, using a portable plant weighing less than 15 cwt. Its main components are a steel plate pressure cylinder, 3 ft. in diameter and 6 ft. long, designed for a working pressure of 10 lb. per sq. in., a steel sheet storage tank of 185 gal. capacity, and a double-acting hand pump with a capacity of about 20 gals. per minute, all mounted on a trailer chassis. There is also an elevated tank in the form of a 44-gal. oil drum fitted with

a float gauge, two 30-ft. plastic hoses, and a 6-ft. suction hose. The working of the equipment is fully described. Adequate preservative retentions can be obtained in four hours in 6-ft. fence posts 4 to 6 in. in diameter of pine (*Pinus radiata*) and in 12 hours with *Eucalyptus* spp. The estimated cost is £250 to £300, which could be reduced to £180 by various modifications, such as the substitution of a small centrifugal pump where electric power is available, of corrugated iron for steel in the storage tanks, and of pipes for hoses.

FERGUS (C. L.). **The influence of actidione on wood-staining fungi.**—*Mycologia*, 48, 4, pp. 468–472, 1 fig., 1956.

At the Department of Botany and Plant Pathology, Pennsylvania State University, the effect of actidione [35, p. 403] on colony diameters of fungi responsible for the staining of timber was tested on difco malt agar. It exerted only a slightly inhibiting effect on most of the 23 species tested. Wide differences in tolerance were observed among species of *Ophiostoma* and two isolates of *Ascocybe grovesii* [34, p. 332]; a type culture of the latter from Ontario was less sensitive than an isolate from *Picea sitchensis* from Colorado, and it was also slightly less sensitive to pentachlorophenol. *O.* [*Ceratocystis*] *piceae* was markedly more sensitive to pentachlorophenol than *A. grovesii*. The results indicate that it may be possible to control red stain of pine caused by *A. grovesii* with actidione.

LYR (H.). **Untersuchungen über die Peroxydasen höherer Pilze.** [Studies on the peroxidases of higher fungi.]—*Planta*, 49, 2, pp. 239–265, 10 graphs, 1956.

In this copiously expanded account of the author's studies on peroxidase production by lignicolous fungi at the Institute for Forest Botany, Eberswalde, Germany [35, p. 407], the number of species examined is given as 182 and those secreting the enzyme as 14. Included in the latter group (besides some already mentioned) were *Phellinus* [*Fomes*] *conchatus*, *Polystictus* [*Polyporus*] *tomentosus*, *Polystictus* [*Polyporus*] *radiatus*, and *P. hispidus*. The fungal peroxidases present many analogies with the same enzyme in horse-radish, but the former are much less resistant to heat, succumbing within five minutes to a temperature between 63° and 74° C., while the latter is only partially inactivated after the same period at 97°. In this respect they do not differ essentially from the laccases, produced by 75 species [loc. cit.]. The optimum pH for peroxidase secretion was found to lie between 5 and 6·3. Tyrosinase was produced by 62 species.

Sap stain control with sodium pentachlorophenate.—*Aust. Timb. J.*, 22, 5, pp. 543, 545, 547, 549, 1956.

Directions are given by 'Timbrol Ltd.' for the control of [unspecified] sap-stain fungi on pine and other timbers in Australia by treatment with sodium pentachlorophenate [cf. 34, p. 828 *et passim*]. Two formulations are available, viz., a stiff, buff-coloured paste containing 9 lb. of the compound per gal. and a clear, pale amber-coloured 15 per cent. solution (1·5 lb. per gal.).

'T JOLLE (J.). **Het optreden van klemharten bij Bloemkolen.** [The occurrence of whiptail in Cauliflowers.]—*Cult. en Hand.*, 22, 3, p. 63, 1956.

As an alternative to spraying cauliflowers with 0·01 per cent. ammonium molybdate for the control of molybdenum deficiency in the Netherlands [31, p. 96], the writer recommends the use of the same compound as a soil amendment in the seed-bed at a dosage of 1 gm. per 100 gm. soil.

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